

Keys to the Bats (Mammalia: Chiroptera) of East Africa

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Abstract

Keys and ancillary information are provided to summarize understanding of the diversity of bats (Mammalia: Chiroptera) in East Africa. We reviewed literature and online databases to aid identification of 145 species of bats known to inhabit Kenya, Tanzania, Burundi, Rwanda, and Uganda. National tallies of species were as follows: Kenya, 108; Tanzania, 105; Uganda, 98; Rwanda, 49; and Burundi, 33. Kenya, Tanzania, and Uganda harbor three of Africa's four richest known bat faunas, but all are incompletely known. Ordination analysis via multidimensional scaling suggests that the East African bat fauna shares elements with those in North Africa, West Africa, and South Africa. We constructed keys to species, drawing from the literature and modifying or expanding them to suit the East African bat fauna. Insofar as possible, we used characters that are visible externally or through cursory cranial or dental inspection. The keys are organized taxonomically: an initial key to the 10 families of bats in East Africa directs the user to separate keys for each family and, in the case of Molossidae and Vespertilionidae, to separate keys for the more diverse genera. Each key is flanked by a brief introduction, a measurement table containing the ranges of various external and cranial measurements (in some cases augmented by salient diagnostic characters), and individual species accounts. The latter contain scientific and common names, type locality and description, geographic range, and current conservation status as determined by IUCN in 2011. Species of certain vespertilionids are too subtly distinguished and/or incompletely documented to be identified with our keys; additional studies of tragus size and shape, bacular morphology, and call notes will be needed to resolve these species. We conclude with accounts for species that we excluded from the East African fauna (with our rationales) and a list of species that may eventually be added to the East African fauna.

Introduction

These keys to the bats of East Africa were constructed as a practical response to the challenges we faced in identifying Kenyan bats. As difficult as identification can be in a museum, it has proven even harder in the field. Several trends in systematics generally and in mammals and bats in particular contribute to this situation.

The last few decades have witnessed a revolution in systematics, one that has incorporated new tools, new concepts, and new methodologies for delimiting and defining taxa. Many groups thought to be well known, such as mammals and amphibians, have proven to be quite poorly understood. Since 1982, the number of recognized mammal species has grown from 4170 species (Honacki et al., 1982) to 5487 species (Schipper et al., 2008). Nearly one-third of the mammalian species we recognize today were unrecognized only 30 years ago! This is a huge degree of ignorance on the class to which we belong, especially one that plays such vital ecological roles in terrestrial, freshwater, and marine ecosystems. As fully one-fifth of all extant mammal species are bats (Wilson & Reeder, 2005; IUCN, 2011), appraisals of their diversity have recently undergone dramatic revision.

Some of these additional names are based on species newly discovered in the field—expeditions in many parts of the world routinely uncover new species of mammals (Morell, 1997; Heaney et al., 2011). However, in most continental areas, an even larger fraction of newly recognized species has come through the revalidation of names that had come to be regarded as synonyms, or multiple names for the same biological entity (Patterson, 1996). The “Modern Synthesis”

of evolution and its biological species concept, prominent in the mid-20th century, helped to promote the notion of widespread polytypic species (Mayr, 1963). Under this concept, a suite of named forms that replace one another geographically were presumed to be linked by interbreeding and therefore could be subsumed under a single species name, becoming synonyms of a single species name. More recently, there have been discipline-wide shifts away from the polytypic species concept to others that emphasize the fact that sets of populations differ diagnostically (see also Cotterill, 2002). This has facilitated our abilities to recognize species, delimit them, and reconstruct their histories. Two species concepts now commonly used in mammalogy—the phylogenetic (Cracraft, 1989) and genetic (Baker & Bradley, 2006) species concepts—have been used to revalidate many names formerly considered synonyms.

While helpful in reshaping our knowledge of diversity, revalidation of synonyms represents an obstacle for those attempting to assemble what is known about species. Virtually any common small mammal appears in the scientific literature under various names at various times, and scientists describing new species compare them only to the set of species recognized at that time. Until it has been comprehensively revised, a species-rich genus often contains members that have not been diagnosed and compared against all congeneric species. As the number of described species proliferates, it becomes a greater challenge to distinguish them from all others.

The issue of synonyms also plagues generic names. Recent decades have witnessed massive improvements in our understanding of the history of mammalian diversification. Better phylogenetic reconstructions of lineage histories have resulted

from the advent and refinement of robust phylogenetic methodologies and algorithms, greatly expanded character sets, vastly improved computational capabilities, and additional taxon sampling through species discovery. Previously, many generic names were applied to unnatural groups; with improved phylogenetic understanding, many species are now recognized as belonging to different genera (e.g., the transfer of species from *Pipistrellus* into *Hypsugo* and *Neoromicia*). The diffuse and polyglot scientific literature makes it difficult to maintain current sets of synonyms for any one taxon, let alone all of those in a diverse tropical biota. This has spurred periodic reappraisals of mammalian nomenclature, and a resulting codification of synonyms, that constitute essential references for systematists, ecologists, and conservationists alike (Wilson & Reeder, 2005).

Chiroptera, the order containing bats, is the second most diverse order of mammals (after Rodentia), with more than 1200 recognized species (Simmons, 2010). Further, Chiroptera exhibits a pronounced latitudinal diversity gradient, being especially rich in the tropics (Willig et al., 2003). Given these trends, it is unsurprising that East African bats are both diverse and difficult to identify. Fewer than half of the bat species in East Africa—here considered as Kenya, Tanzania, Burundi, Rwanda, and Uganda—were initially described in the genus to which they are allocated today. Moreover, most of the literature on the bats of East Africa is relatively old; the last comprehensive regional monograph (Kingdon, 1974) is now 38 years old. Although scientists have continued to uncover new species in East Africa (Bergmans, 1980; Kock et al., 2000; Stanley, 2008), until recently the pace of discovery has lagged behind that of other regions. For example, since the publication of Albuja's (1999) monograph on the bats of Ecuador, 11 species have been newly described from that country's bat fauna. In Africa, only Madagascar has witnessed a comparable level of discovery. Synthesis and understanding of East African bats has lagged behind efforts to understand other African bat faunas, most notably in Southern Africa and Madagascar (Monadjem et al., 2010b; Goodman, 2011). These keys are a step towards remedying this situation.

Methods

We used the synonymic histories for East African bats as summarized in Simmons (2005) to survey literature on bats. Distributional records of species were compiled, especially from Simmons (2005) and from IUCN (2011), but sometimes shaped by our own interpretations of primary and secondary literature. We then assembled bat records by country for the five East African countries, their immediate neighbors, and well-sampled countries in North Africa (Libya and Egypt), West Africa (Côte d'Ivoire, Nigeria, and Cameroon), and South Africa, using the IUCN bat lists compiled on Wikipedia (2011) and the synonymies employed in Simmons (2005) and IUCN (2011), except as noted in our species accounts. Wikipedia was also used to obtain latitude midpoints and areal extent of each country for correlation analyses; given the ubiquity of the latitudinal diversity gradient, we used the absolute value of latitude in the analyses.

We used Statistica 7.0 (StatSoft Inc., 2005) to analyze these data. National species richness counts were subjected to product-moment correlation analyses and stepwise multiple regression analyses against area (obtained from Wikipedia pages) and latitude (obtained for each country from the

GeoNames search of the National Geospatial-Intelligence Agency: <http://geonames.nga.mil/ggmagaz/>). Following statistical convention, an alpha level of 5% was used to gauge significance and values between 5 and 10% were deemed marginally significant. We generated a distance matrix between African nations, based on percent disagreement of their bat faunas, using the presence-absence matrix in Appendix I. Percent disagreement is especially useful when data being compared are categorical, as in presence-absence matrices. The distance matrix was then subjected to a multidimensional scaling analysis, using Statistica 7.0. Unlike the more familiar principal components analysis, multidimensional scaling provides an ordination of data points without assuming the underlying multivariate normality of variables.

Following the Results and Discussion, we present a general key to the 10 families of bats documented in East Africa. Separate keys are presented for each of the families, to species or, in the case of species-rich families, to genera. In the latter case, keys to the species of each genus follow. Keys and species accounts are ordered phylogenetically (Jones et al., 2005) through family, and then alphabetically by genus and species. Most keys are updated or expanded versions of keys that were provided by Hayman and Hill (1971), Rosevear (1965), or Stanley (2011), but additional sources were also used. As the first two of these sources are both now out of print and hard to access in East Africa, revision and extension of their keys will make them more accessible to a new generation of researchers. For some genera of Vespertilionidae, especially where karyology, gene sequences, or echolocation calls have permitted delimitation of cryptic species, reliable diagnoses using morphology have proven impractical. Additional research will be needed to fill in the character matrix for these forms and facilitate their separation on morphological grounds via dichotomous keys. For comparisons, dental formulae for all genera of East African bats are presented in Appendix II.

Following each key, we provide tabulations of the external and cranial measurements for each species. All lengths and breadths in the tables are in millimeters, and all masses are given in grams. Pertinent anatomical features and measurements are shown in Figure 1. Data for each species were assembled from published sources cited in each table or from specimens in the Recent mammal collections of Field Museum of Natural History (FMNH) or the National Museum of Natural History (USNM). Authorities are cited in order of our reliance on their accounts. Where possible, tabulations include ranges (minimum to maximum) of published mensural variables. Because data were frequently assembled from multiple sources that document species across their geographic distributions, ranges sometimes encompass subspecific and clinal geographic variation, as well as sexual dimorphism, and in at least a few cases, age-related variation. Logically, there is more overlap between species in these tabulated ranges than in samples of those species from any point within their geographic distributions.

Tabulations relied importantly on the monographs of Rosevear (1965) on West African bats and Monadjem et al. (2010b) on Central and Southern African bats, as well as Aggundey and Schlitter (1984), Thorn et al. (2009), and Stanley (2011) for East African bats. Some of the measurement tables also include qualitative traits that can arbitrate or confirm decisions made with the keys; a number of these

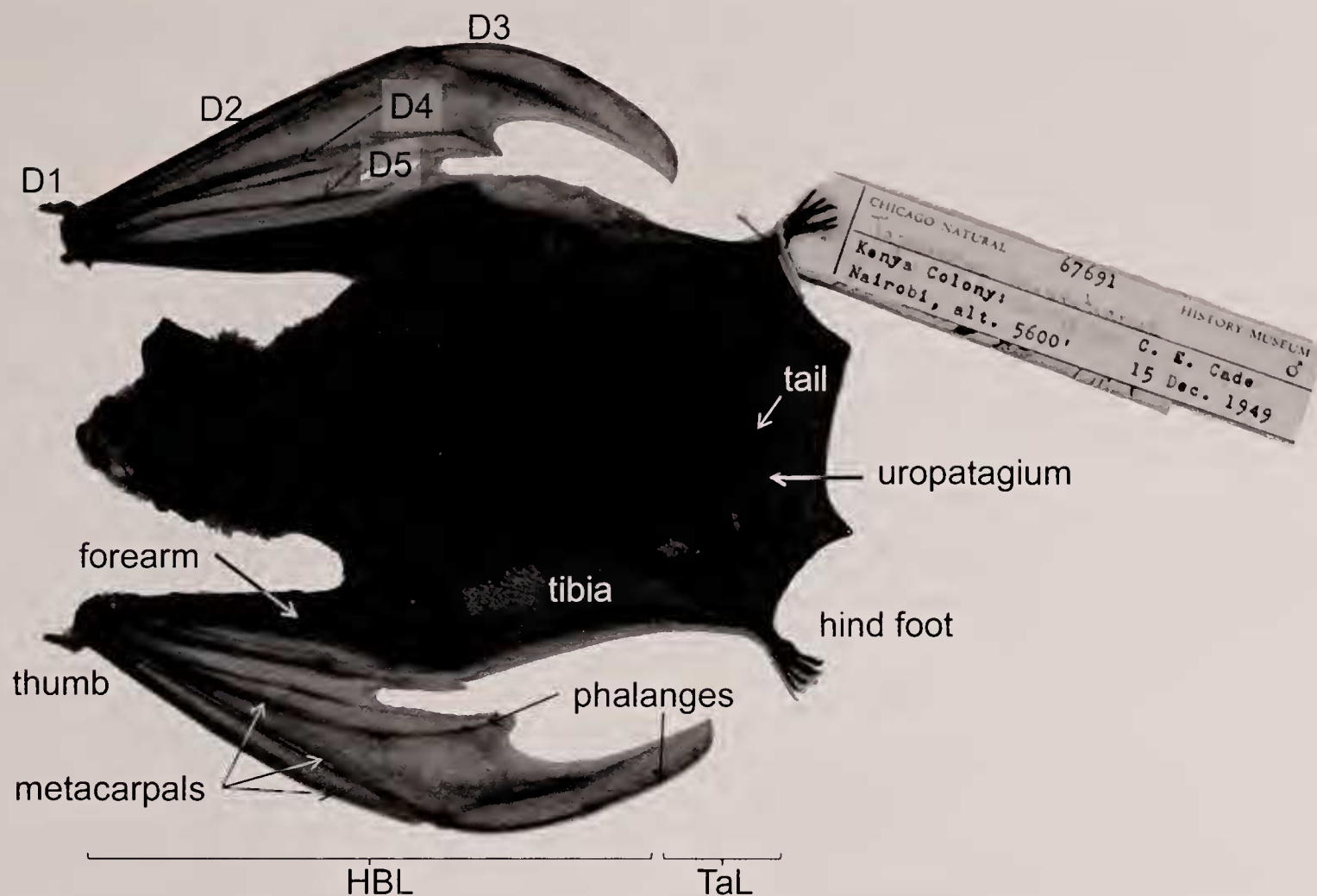


FIG. 1. A museum specimen (FMNH 67691) of the emballonurid *Taphozous mauritanus* showing some of the external measurements reported (HBL, head-and-body length; TaL, tail length), and various anatomical features (D, digit) referenced in the keys. Photo by B. D. Patterson.

tabulations are incomplete because traits for certain species have not yet been noted in the literature.

The final part of each section includes species accounts (ordered alphabetically) that contain full scientific name and common name(s) as listed in Simmons (2005) and by IUCN (2011), amended in the case of honorific possessives. Accounts also include type locality and original description, any relevant taxonomic remarks, known geographic distribution, and conservation status. The nomenclature used largely follows Simmons (2005), in some cases amended by IUCN (2011) or other more recent sources. Geographic distribution and conservation status reflect maps and formal IUCN Red List categories and criteria (IUCN, 2011). Taxonomic remarks reflect our own judgments and are accompanied by the caveat that the fauna needs a thorough monograph; currently, most taxonomic opinions are based on less than comprehensive foundations and should be considered preliminary. Indeed, we assembled this key in order to comprehensively review distributions, species limits, and taxonomy of East African bats.

Abbreviations and Conventions Used in the Keys and Identification Tables

- CBL—condylobasal length
- CIL—condyloincisive length
- D (D1, D2)—digit (first digit, second digit)
- EL—ear length
- FA—forearm length
- GLS—greatest length of skull
- HBL—head-and-body length (excluding tail)
- HF—hind foot length. In most cases, data follow the American convention of including unguis (claws), but historic data reflect the British tradition of measuring feet without claws.

- M—mass, in grams
- ML—length of mandible
- TaL—tail length
- TiL—tibia length
- ToL—total length
- TrL—tragus length
- ZB—greatest breadth across zygomatic arches

Specialized Terminology

Baculum (-a)—rod-like penis bone(s) found in most bat families; otherwise similar-looking species of bats can often be distinguished by the shape and size of the baculum.

Canine—the typically long pointed tooth in the front corner of each jaw.

Cheek-teeth—the upper and lower teeth posterior to the canines, consisting of premolars (immediately behind the canine) and molars (the posterior-most teeth behind these).

Cingulum—the enamel ridge around the base of the teeth.

Condylobasal length—distance from the posterior margins of the occipital condyles (where the skull rests on neck vertebrae) to the anterior-most projection of the premaxilla bone.

Condyloincisive length—distance from the posterior margins of the occipital condyles to the anterior face of the upper incisors.

Connecting process—a bridge between the sella and the lancet in the noseleaf of Rhinolophidae, most visible in profile.

Forearm—the long, robust bones (radius and ulna) between the elbow and wrist that form the largest and sturdiest part of a bat's wing (Fig. 1).

Gular pouch—a pocket of skin on the throat of some emballonurid bats.

Incisors—the small teeth between the canines in both upper and lower jaws.

Horseshoe—the flattened disk forming the foundation of the noseleaf of Rhinolophidae.

Lancet—the posterior portion of the noseleaf of Rhinolophidae, typically triangular in shape.

Mandible (mandibular)—(of) the lower jaw.

Maxilla (maxillary)—(of) the upper jaw.

Metacarpal—a wrist bone that forms the basal element of the “finger” that supports the flight membrane (Fig. 1).

Molars—the posterior-most cheek-teeth in the jaw, not present in the deciduous or milk-tooth dentition.

Palate—the roof of the mouth, used both for the skull (hard palate) and for the membranes investing the mouth (soft palate).

Patagium—flight membranes of the wing, including *propatagium* (membrane attached to the leading edge of the forelimb), *plagiopatagium* (posterior membrane between the forearm, femur and fifth digit), *dactylopatagium* (interdigital membranes), and *uropatagium* (membrane between the hindlimbs; cf. Fig. 1).

Phalanx (-ges)—the terminal element(s) of the digits.

Pinna—the fleshy structure of the external ear.

Postorbital process—a finger-like projection of the roof of the skull above and behind the orbit, which houses the eye.

Premolars—the cheek-teeth behind the canine that are present in both the deciduous and permanent dentition.

Quadrant—either the left or right side of the upper or lower dentition.

Sella—a structure in the center of the noseleaf of Rhinolophidae, saddle-shaped when viewed from the front.

Tibia—the long bone of the leg between knee and ankle.

Tragus—a fleshy structure of variable size and shape extending into the pinna of the ear in many families of bats.

Uropatagium—the interfemoral flight membrane that typically encloses all or a portion of the tail.

Zygomatic arches—the protruding cheek bones under the eye.

zuluensis, and *Pipistrellus grandidieri*. Authorities validating these names and establishing them in East Africa are cited in the species accounts.

This regional fauna is rich, rivaling the richest bat faunas on earth. National tallies of species in East African countries were as follows: Kenya, 108; Tanzania, 105; Uganda, 98; Rwanda, 49; and Burundi, 33. Comparing these numbers to those of other African nations (Fig. 2), two patterns are immediately evident. First, there is a strong latitudinal gradient for bat species richness, with equatorial diversity almost twice that of South Africa's and five times that of North Africa. The strength of this relationship even dwarfs the familiar species–area relationship. Whereas national species richness and latitude were significantly and inversely correlated ($r = -0.597$; $P < 0.01$), richness of bat faunas was not correlated with area ($r = 0.132$; $P = 0.6$). In stepwise multiple regressions of species richness on latitude and area, latitude entered the equation first, and coefficients for the intercept and latitude were highly significant ($P < 0.005$), whereas that for area was non-significant ($P > 0.1$). Second, East Africa and the neighboring Democratic Republic of Congo apparently house the continent's richest bat faunas. Several forest-dependent mammal groups (e.g., Primates) show higher species richness in West Africa, so the relative richness of East African bat faunas is especially interesting. Findley (1993: figure 6.3) noted the regional richness of East Africa's bat faunas, but mapped it with an isoline of 60 species, substantially lower than is apparent today.

Counts of bat species for African nations, which peak at 117 species for the Democratic Republic of Congo, trail those recorded for the richest countries in Southeast Asia (Indonesia, 221 species; IUCN, 2011) and tropical America (Colombia, 178 species; Alberico et al., 2000). Yet, compared to those faunas, more families of bats inhabit East Africa (10, versus nine for both America and Asia) and a greater proportion of its bat fauna feeds on insects: the East African bat fauna consists of 17 species of frugivores and 1 nectarivore (Pteropodidae), 11 species of omnivores (mainly insectivores; Megadermatidae and Nycteridae), and 115 species that feed mainly on arthropods (remaining families).

The projection of 18 countries onto the first two dimensions is shown in Figure 3. The ordination reflects the latitudinal richness gradient along Dimension 1, with rich equatorial faunas on the left and more impoverished ones, both high latitude and those with fewer records and species, on the right. Loadings on Dimension 1 are inversely correlated with national species richness at $r = -0.766$ ($P < 0.001$) and positively correlated with latitude at $r = 0.731$ ($P = 0.001$), whereas loadings on Dimension 2 were marginally correlated with species richness at $r = 0.445$ ($P = 0.06$) and not correlated with area or latitude ($P > 0.10$). Faunas from Southern Africa, West Africa, and North Africa all lie at extreme positions on the first or second axis. The heterogeneity of bat faunas in the five East African countries (shown as squares) is reflected by their separation; Kenya and Tanzania have high loadings on Dimension 2, reflecting their endemism (see below), whereas Uganda, Burundi, and Rwanda lie closer to the centroid, befitting their Central African locations. In fact, East Africa supports more than 68% of the bat species documented in all 18 nations.

In fact, a number of bat species occur nowhere else. Global endemics include *Pteropus voeltzkowi* (endemic to Tanzania), *Rhinolophus hilli* (Rwanda), *Taphozous hildegardeae* (Kenya

Results and Discussion

Our checklist of bats documented in East Africa appears in Table 1—in all, 145 species of bats are known to occur in East Africa. The list is almost certainly incomplete, as many studies of East African bats are now dated, and few have used modern tools to explore DNA sequence variation, karyology, genital morphology, or echolocation calls.

Our list differs from that recently compiled by Kityo et al. (2009a) in their atlas of East African bats. Those authors included nine species that we do not include, namely *Epomophorus gambianus*, *E. minor*, *Rhinopoma hardwickii*, *Miniopterus schreibersii*, *Neoromicia flavescens*, *Pipistrellus deserti*, *P. inexpectatus*, *P. kuhlii*, and *Scotophilus nucella*. For reasons stated in the species accounts at the end of this work, mainly having to do with the need for taxonomic revisions, we consider these records as being either based on misidentifications of East African specimens or as synonyms of recognized species. On the other hand, our list includes 13 species not covered by Kityo et al. (2009a): *Rhinolophus hilli*, *Asellia tridens*, *Rhinopoma macinnesi*, *Nycteris aurita*, *Mops bakarii*, *Kerivoula cuprosa*, *Glauconycteris alboguttata*, *G. humeralis*, *Laephotis botswanae*, *Neoromicia helios*, *N. cf. melckorum*, *N.*

TABLE 1. Checklist of the bats of East Africa (Burundi, Kenya, Rwanda, Tanzania, and Uganda).

Family Pteropodidae (Old World fruit bats) 12 genera, 18 species

1. *Casinonycteris argynnis* Thomas, 1910
2. *Eidolon helvum* (Kerr, 1792)
3. *Epomophorus crypturus* Peters, 1852
4. *Epomophorus labiatus* (Temminck, 1837)
5. *Epomophorus minimus* Claessen and De Vree, 1991
6. *Epomophorus wahlbergi* (Sundevall, 1846)
7. *Epomops dobsonii* (Bocage, 1889)
8. *Epomops franqueti* (Tomes, 1860)
9. *Hypsignathus monstrosus* H. Allen, 1861
10. *Lissonycteris angolensis* (Bocage, 1898)
11. *Megaloglossus woermanni* Pagenstecher, 1885
12. *Micropteropus pusillus* (Peters, 1868)
13. *Myonycteris relicta* Bergmans, 1980
14. *Myonycteris torquata* (Dobson, 1878)
15. *Pteropus seychellensis* Milne-Edwards, 1877
16. *Pteropus voeltzkowi* Matschie, 1909
17. *Rousettus aegyptiacus* (É. Geoffroy, 1810)
18. *Stenonycteris laosus* (Thomas, 1906)

Family Rhinolophidae (Horseshoe bats) 1 genus, 14 species

19. *Rhinolophus alcyone* Temminck, 1853
20. *Rhinolophus blasii* Peters, 1867
21. *Rhinolophus clivosus* Cretzschmar, 1828
22. *Rhinolophus darlingi* K. Andersen, 1905
23. *Rhinolophus deckenii* Peters, 1868
24. *Rhinolophus eloquens* K. Andersen, 1905
25. *Rhinolophus fumigatus* Rüppell, 1842
26. *Rhinolophus hildebrandtii* Peters, 1878
27. *Rhinolophus hilli* Aellen, 1973
28. *Rhinolophus landeri* Martin, 1838
29. *Rhinolophus maendeleo* Kock, Csorba, and Howell, 2000
30. *Rhinolophus ruwenzorii* J. Eric Hill, 1942
31. *Rhinolophus simulator* K. Andersen, 1904
32. *Rhinolophus swinnyi* Gough, 1908

Family Hipposideridae (Old World leaf-nosed bats) 4 genera, 13 species

33. *Asellia tridens* (É. Geoffroy, 1813)
34. *Cloeotis percivali* Thomas, 1901
35. *Hipposideros abae* J. A. Allen, 1917
36. *Hipposideros beatus* K. Andersen, 1906
37. *Hipposideros caffer* (Sundevall, 1846)
38. *Hipposideros camerunensis* Eisentraut, 1956
39. *Hipposideros cyclops* (Temminck, 1853)
40. *Hipposideros fuliginosus* (Temminck, 1853)
41. *Hipposideros gigas* (Wagner, 1845)
42. *Hipposideros megalotis* (Heuglin, 1861)
43. *Hipposideros ruber* (Noack, 1893)
44. *Hipposideros vittatus* (Peters, 1852)
45. *Triaenops persicus* Dobson, 1871

Family Megadermatidae (False vampire bats) 2 genera, 2 species

46. *Cardioderma cor* (Peters, 1872)
47. *Lavia frons* (É. Geoffroy, 1810)

Family Rhinopomatidae (Mouse-tailed bats) 1 genus, 1 species

48. *Rhinopoma macinnesi* Hayman, 1937

Family Emballonuridae (Sheath-tailed bats) 3 genera, 7 species

49. *Coleura afra* (Peters, 1852)
50. *Saccolaimus peli* (Temminck, 1853)
51. *Taphozous hamiltoni* Thomas, 1920
52. *Taphozous hildegardeae* Thomas, 1909
53. *Taphozous mauritanus* É. Geoffroy, 1818
54. *Taphozous nudiventris* Cretzschmar, 1830
55. *Taphozous perforatus* É. Geoffroy, 1818

Family Nycteridae (Slit-faced bats) 1 genus, 9 species

56. *Nycteris arge* Thomas, 1903
57. *Nycteris aurita* (K. Andersen, 1912)
58. *Nycteris grandis* Peters, 1865
59. *Nycteris hispida* (Schreber, 1775)
60. *Nycteris intermedia* Aellen, 1959
61. *Nycteris macrotis* Dobson, 1876

TABLE 1. Continued.

62. *Nycteris nana* (K. Andersen, 1912)
63. *Nycteris thebaica* É. Geoffroy, 1818
64. *Nycteris woodi* K. Andersen, 1914

Family Molossidae (Free-tailed and Mastiff bats) 6 genera, 26 species

65. *Chaerephon aloysiisabaudiae* (Festa, 1907)
66. *Chaerephon ausorgei* (Thomas, 1913)
67. *Chaerephon bemmeleni* (Jentink, 1879)
68. *Chaerephon bivittatus* (Heuglin, 1861)
69. *Chaerephon chapini* J. A. Allen, 1917
70. *Chaerephon major* (Trouessart, 1897)
71. *Chaerephon uigeriae* Thomas, 1913
72. *Chaerephon punilus* (Cretzschmar, 1830–1831)
73. *Chaerephon russatus* J. A. Allen, 1917
74. *Mops bakarii* Stanley, 2008
75. *Mops brachypterus* (Peters, 1852)
76. *Mops condyhrus* (A. Smith, 1833)
77. *Mops congicus* J. A. Allen, 1917
78. *Mops demonstrator* (Thomas, 1903)
79. *Mops midas* (Sundevall, 1843)
80. *Mops nanulus* J. A. Allen, 1917
81. *Mops niveiventer* Cabrera and Ruxton, 1926
82. *Mops thersites* (Thomas, 1903)
83. *Mops trevori* J. A. Allen, 1917
84. *Myopterus whitleyi* (Scharff, 1900)
85. *Otomops martiensseni* (Matschie, 1897)
86. *Platymops setiger* (Peters, 1878)
87. *Tadarida aegyptiaca* (É. Geoffroy, 1818)
88. *Tadarida fulminans* (Thomas, 1903)
89. *Tadarida lobata* (Thomas, 1891)
90. *Tadarida ventralis* (Heuglin, 1861)

Family Miniopteridae (Long-fingered bats) 1 genus, 5 species

91. *Miniopterus africanus* Sanborn, 1936
92. *Miniopterus fraterculus* Thomas and Schwann, 1906
93. *Miniopterus inflatus* Thomas, 1903
94. *Miniopterus minor* Peters, 1867
95. *Miniopterus natalensis* (A. Smith, 1833)

Family Vespertilionidae (Evening bats) 12 genera, 50 species

96. *Eptesicus hottentotus* (A. Smith, 1833)
97. *Glauconycteris alboguttata* J. A. Allen, 1917
98. *Glauconycteris argentata* (Dobson, 1875)
99. *Glauconycteris beatrix* Thomas, 1901
100. *Glauconycteris egeria* Thomas, 1913
101. *Glauconycteris gleni* Peterson and Smith, 1973
102. *Glauconycteris humeralis* J. A. Allen, 1917
103. *Glauconycteris kenyacola* Peterson, 1982
104. *Glauconycteris poensis* (Gray, 1842)
105. *Glauconycteris variegata* (Tomes, 1861)
106. *Hypsugo crassulus* (Thomas, 1904)
107. *Hypsugo eisentrauti* (Hill, 1968)
108. *Kerivoula africana* Dobson, 1878
109. *Kerivoula argentata* Tomes, 1861
110. *Kerivoula cuprosa* Thomas, 1912
111. *Kerivoula lanosa* (A. Smith, 1847)
112. *Kerivoula phalaena* Thomas, 1912
113. *Kerivoula smithii* Thomas, 1880
114. *Laephotis botswanae* Setzer, 1971
115. *Laephotis wintoni* Thomas, 1901
116. *Mimetillus moloneyi* (Thomas, 1891)
117. *Myotis bocagii* (Peters, 1870)
118. *Myotis tricolor* (Temminck, 1832)
119. *Myotis welwitschii* (Gray, 1866)
120. *Neoromicia capensis* (A. Smith, 1829)
121. *Neoromicia guineensis* (Bocage, 1889)
122. *Neoromicia helios* (Heller, 1912)
123. *Neoromicia cf. melckorum* (Roberts, 1919)
124. *Neoromicia nana* (Peters, 1852)
125. *Neoromicia rendalli* (Thomas, 1889)
126. *Neoromicia somalica* (Thomas, 1901)
127. *Neoromicia tenuipinnis* (Peters, 1872)
128. *Neoromicia zuhuensis* (Roberts, 1924)
129. *Nycticeinops schlieffeni* (Peters, 1859)
130. *Pipistrellus aero* Heller, 1912

TABLE 1. Continued.

131. <i>Pipistrellus grandidieri</i> (Dobson, 1876)
132. <i>Pipistrellus hesperidus</i> (Temminck, 1840)
133. <i>Pipistrellus nanulus</i> Thomas, 1904
134. <i>Pipistrellus permixtus</i> Aellen, 1957
135. <i>Pipistrellus rueppellii</i> (J. Fischer, 1829)
136. <i>Pipistrellus rusticus</i> (Tomes, 1861)
137. <i>Scotoecus albigula</i> Thomas, 1909
138. <i>Scotoecus albofuscus</i> (Thomas, 1890)
139. <i>Scotoecus hindei</i> Thomas, 1901
140. <i>Scotoecus hirundo</i> (de Winton, 1899)
141. <i>Scotophilus dinganii</i> (A. Smith, 1833)
142. <i>Scotophilus leucogaster</i> (Cretzschmar, 1830)
143. <i>Scotophilus nigrata</i> (Schreber, 1775)
144. <i>Scotophilus nux</i> Thomas, 1904
145. <i>Scotophilus viridis</i> (Peters, 1852)

and Tanzania), *Mops bakarii* (Tanzania), *Glauconycteris kenya-*
cola (Kenya), *Kerivoula africana* (Tanzania), and *Pipistrellus*
permixtus (Tanzania). Several additional species scarcely range
outside of East Africa: *Pteropus seychellensis*, Tanzania to
the Seychelles and Comoros; *Tadarida lobata*, Tanzania to

Zimbabwe; *Glauconycteris egeria*, Uganda to Central African
Republic and Cameroon; and *G. gleni*, Uganda and Tanzania to
Cameroon.

Key to Bat Families in East Africa

The family-level key has been modified from Rosevear (1965)
and Stanley (2011).

- 1 Claw present on D2 that is exposed on the edge of the wing (Fig. 4C) **Pteropodidae**
- 1' No claw on the end of D2 2
- 2 Uropatagium present; tail not visible, either within the membrane or emerging from it; no upper incisors; tragus forked **Megadermatidae** (Fig. 7)
- 2' Tail visible, either fully or partially enclosed in the uropatagium; upper incisors present; tragus (if present) unilobed 3
- 3 Fleshy projections or "noseleaves" on the muzzle of the face 4

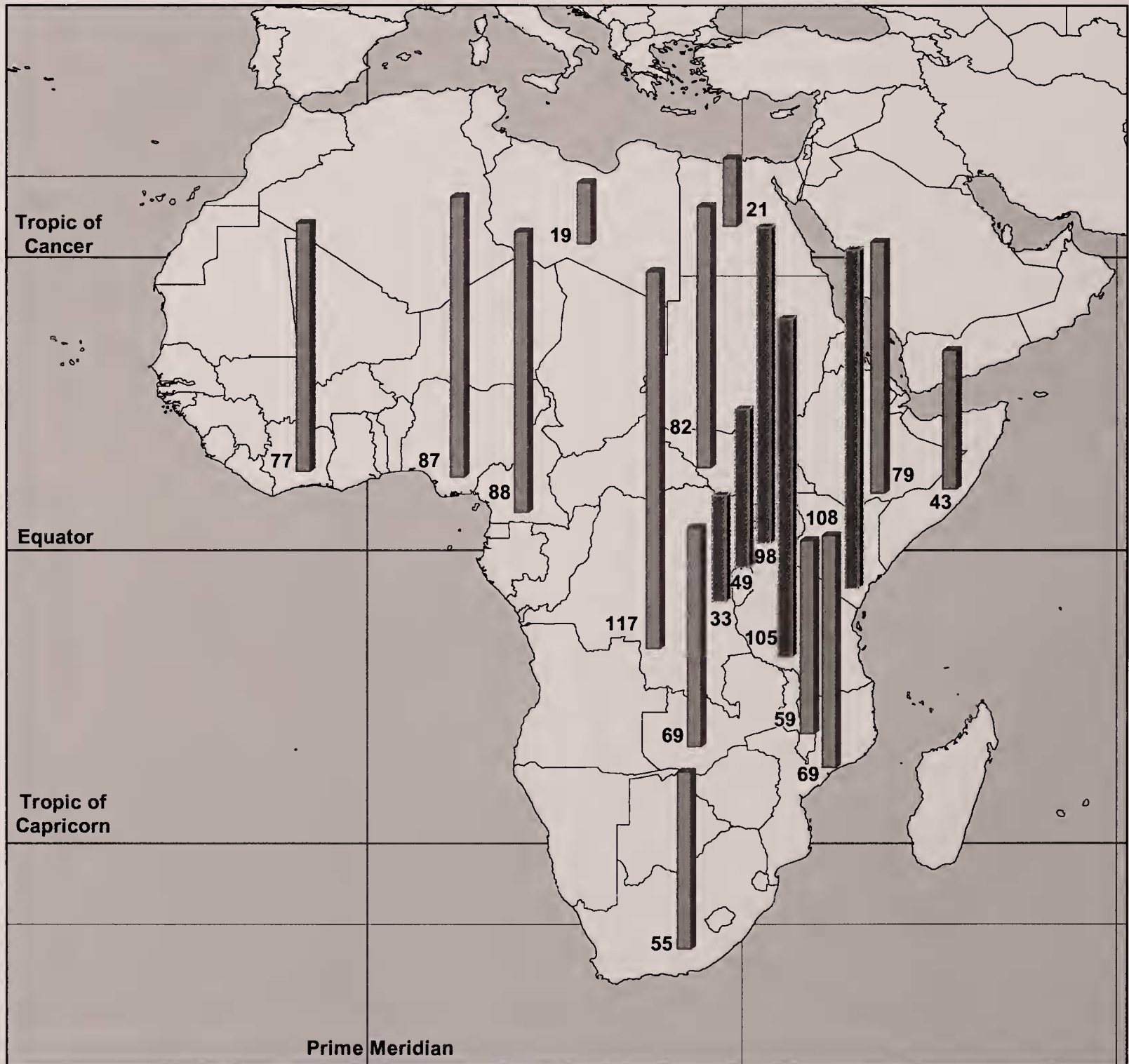


FIG. 2. Species richness of bat faunas in 18 African nations; the five East African nations are marked by darker columns. Data source: mainly IUCN (2011) listings as compiled by Wikipedia (2011) and amended in Appendix I.

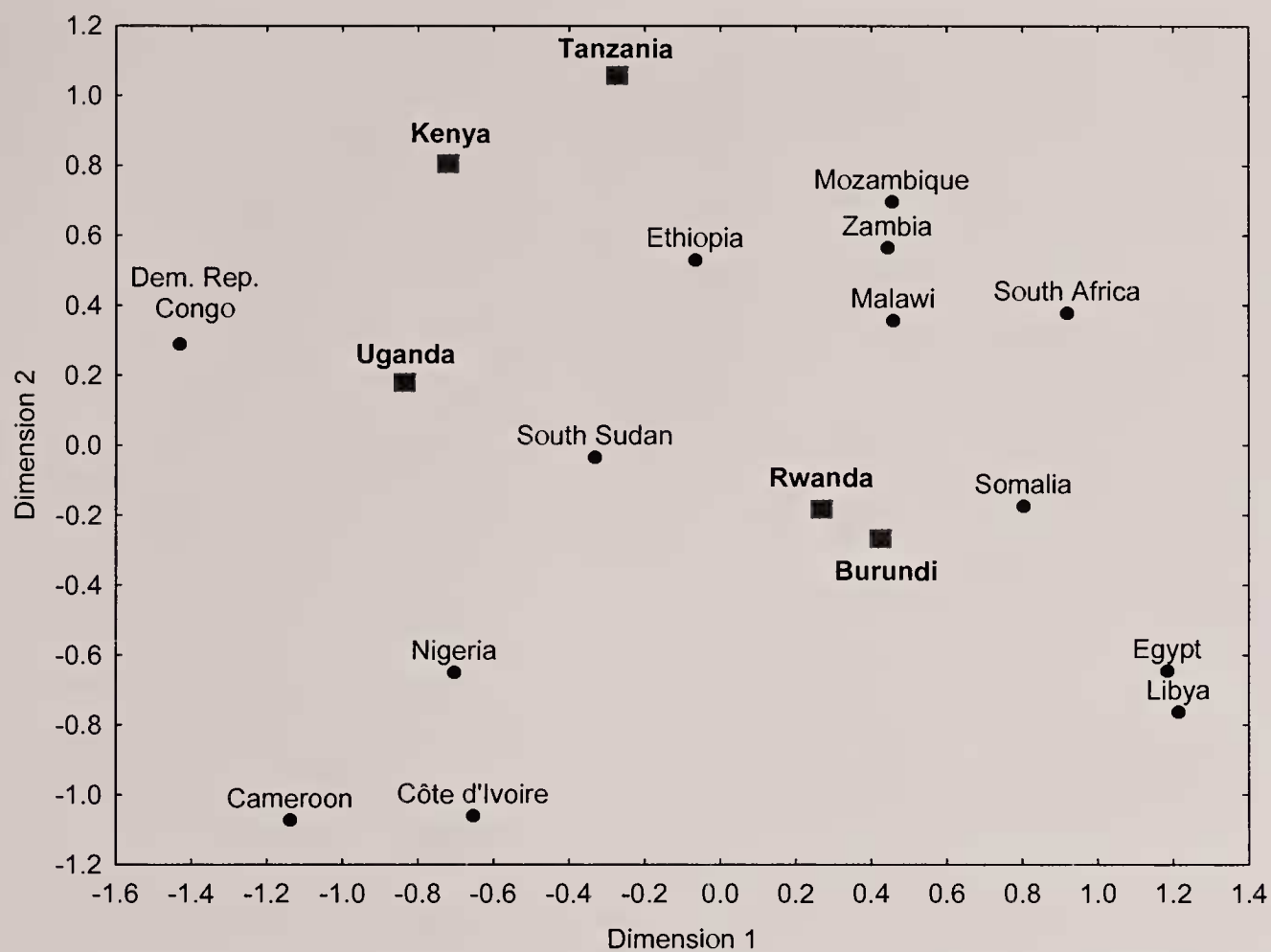


FIG. 3. Ordination via multidimensional scaling of percent disagreement matrix for bat faunas of 18 African nations. East African bat faunas marked by squares. Dimension 1 is inversely correlated with species richness and positively correlated with latitude. The plotting positions of East African countries in terms of their bat faunas reflect their richness (especially Kenya and Uganda), endemism (especially Kenya and Tanzania), and location in equatorial Africa (especially Uganda, Rwanda, and Burundi). Data from Appendix I.

- 3' No fleshy projections or "noseleaves" on the muzzle of the face 6
- 4 A deep longitudinal slit from the nostrils to the forehead, surrounded by fleshy projections on the muzzle oriented along its axis (Figs. 10B, D); tip of tail with Y-shaped cartilage visible through skin (Fig. 10C) **Nycteridae**
- 4' No deep longitudinal slit from the nostrils to the forehead, and any fleshy projections on the muzzle oriented perpendicularly to the muzzle (Figs. 5, 6); tip of tail without Y-shaped cartilage visible through skin 5
- 5 Posterior noseleaf pointed or erect; three phalanges in each toe **Rhinolophidae** (Fig. 5)
- 5' Posterior noseleaf elliptical; two phalanges in each toe **Hipposideridae** (Fig. 6)
- 6 Tail fully enclosed in the uropatagium, with only the tip protruding from its margin. 7
- 6' Tail entirely or partially free of the uropatagium (Fig. 11A). 8
- 7 Second phalanx of D3 of the wing approximately three times the length of the first phalanx, such that the wing can fold back on itself. **Miniopteridae** (Figs. 12, 14L)
- 7' Second phalanx of D3 of the wing not more than twice the length of the first phalanx . . . **Vespertilionidae** (Figs. 13, 14)
- 8 Tip of the tail free of and emergent dorsally from the middle of the uropatagium; skull with a narrow finger-like postorbital process. **Emballonuridae** (Fig. 9)
- 8' Tail entirely or partially free; skull without postorbital process. 9
- 9 Free end of the tail emerging from the trailing margin of the uropatagium, and extending little beyond it **Molossidae** (Fig. 11)

- 9' Free end of the tail long and whip-like, extending far beyond the uropatagium **Rhinopomatidae** (Fig. 8)

Pteropodidae

Pteropodidae, or Old World fruit bats, is a Palearctic family containing 44 extant genera and 187 recognized species (IUCN, 2011; Almeida et al., 2011). Their diversity is greatest in tropical Asia; for the most diverse genus (*Pteropus*), only two of 65 species are found in Africa proper, and both of these inhabit offshore Indian Ocean islands. The deeper history of the pteropodid radiation is still being resolved (Almeida et al., 2011). In total, 15 genera are known from Africa, and all save *Nanonycteris*, *Plerotes*, and *Scotonycteris* have been recorded in East Africa. Traditionally recognized as the sole members of the suborder Megachiroptera, the pteropodids are now known to share common ancestry with a set of microbats; in East Africa, these are represented by the Rhinolophidae, Hipposideridae, Megadermatidae, and Rhinopomatidae (Teeling et al., 2002; Jones et al., 2005). The pteropodids are the only plant-dependent bat family in the Old World; most species are frugivorous, but some are largely nectar and pollen feeders, and others even eat leaves (Kunz & Diaz, 1995). Their cheek-teeth are low and smooth crowned. All African species save *Rousettus aegyptiacus* (Holland et al., 2004) are thought to navigate visually and to use olfaction to locate fruit and flowers; their roosting habits vary (Figs. 4B, D).

The key to Pteropodidae has been adapted from Stanley (2011) with additions from Kingdon (1974), Bergmans (1980), Kwiecinski and Griffiths (1999), and Thorn et al. (2009).

- 1 Very small (FA 37–46 mm); slender muzzle; long tongue with dense brush at tip; cheek-teeth extremely reduced. *Megaloglossus woermanni*
- 1' Larger (FA > 47 mm); muzzle heavier; tongue not greatly elongated; cheek-teeth not reduced 2
- 2 Facial pattern with white nose spot and white eye patches. *Casinycteris argynnis*
- 2' Facial pattern lacking white nose spot and eye patches. 3
- 3 White or yellow tuft of hair at the base of each ear; males typically with a white or yellow tuft of hair on the shoulders 4
- 3' No white or yellow tuft of hair at the base of each ear; males lacking a white or yellow tuft of hair on the shoulders (a collar of coarse hair on the neck present in some) 11
- 4 Smaller (FA < 60 mm; GLS < 31 mm); palate abruptly narrowed behind zygomatic processes; soft palate with longitudinal furrow bisecting transverse ridges, forked anteriorly *Micropteropus pusillus*
- 4' Larger (FA > 60 mm; GLS > 31 mm); palate more smoothly tapered; soft palate without longitudinal furrow. 5
- 5 Larger (FA 118–137 mm); heavy head, muzzle not tapered; lacking white shoulder tufts *Hypsignathus monstrosus*
- 5' Smaller (FA 53–105 mm); tapered head; adult males with conspicuous shoulder tufts. 6
- 6 Head round and snout blunt; two or more (up to seven) post-dental ridges on soft palate, less robust than ridges between teeth. 7
- 6' Head and snout elongate; one or two post-dental ridges on soft palate, differing little from inter-dental ridges 8
- 7 Three palatal ridges on soft palate between cheek-teeth; two ridges behind cheek-teeth, with triangular projections *Epomops dobsonii*
- 7' Four palatal ridges on soft palate between cheek-teeth; at least five ridges behind the cheek-teeth, these thin and serrated without triangular projections. *Epomops franqueti*
- 8 Small (FA 53–67 mm); belly usually pale or whitish, strongly differentiated from darker collar on neck and chest (especially males); two post-dental ridges. *Epomophorus minimus*
- 8' Larger (FA 67–100 mm); belly and chest variable; one or two post-dental ridges. 9
- 9 One post-dental palatal ridge; belly usually uniform *Epomophorus wahlbergi*
- 9' Two post-dental palatal ridges; belly uniform or patchy 10
- 10 FA 80–88 mm (males) and 75–83 mm (females); ZB 25.5–27.4 mm (males) and 23.5–25.7 mm (females); belly uniformly grayish *Epomophorus crypturus*
- 10' FA 66.7–80.3 mm (males) and 64.8–78.3 mm (females); ZB 21.6–25.3 mm (males) and 20–24 mm (females); usually whitish patches on belly. *Epomophorus labiatus*
- 11 Larger (FA > 109 mm). 12
- 11' Smaller (FA < 109 mm) 14
- 12 Tail not visible; no color contrast between dorsal fur and skin of the wings; fur of upper back and head distinctly more yellowish-reddish than darker fur of lower back 13
- 12' Short tail visible; clear demarcation between yellowish-brown fur of dorsum and naked black skin of wings; fur of upper back and head same color as fur of lower back. *Eidolon helvum*
- 13 Head deep reddish and belly orange; EL < 27 mm; from Pemba Island *Pteropus voeltzkowi*
- 13' Head paler with mantle and belly yellowish; EL > 27 mm; from Mafia Islands *Pteropus seychellensis*
- 14 Stiff collar of hairs on neck, shoulders, and upper chest; reduced second upper molar (half the size of the first). 15
- 14' Collar present or absent; second upper molar only slightly smaller than first 16
- 15 Larger (FA 66–75 mm) with a long and slender rostrum (muzzle); lacking lower third molar. . . . *Myonycteris relicta*
- 15' Smaller (FA 55–67 mm) with shortened rostrum; rudimentary lower third molar *Myonycteris torquata*
- 16 Larger (FA > 90 mm); dorsal pelage sparse between shoulders *Rousettus aegyptiacus*
- 16' Smaller (FA < 90 mm); dorsal pelage not sparse between shoulders 17
- 17 TiL > 35 mm; no collar of stiff hairs in males; tail roughly 10 mm; braincase strongly deflected ventrally from axis of rostrum; premaxillaries not fused together; cheek-teeth very narrow *Stenonycteris lanosus*
- 17' TiL < 35 mm; adult males with collar of stiff hairs; tail inconspicuous; braincase slightly deflected; premaxillaries fused; cheek-teeth broad *Lissonycteris angolensis*

TABLE 2. Measurements for genera of Pteropodidae represented in East Africa by a single species. Abbreviations and definitions for measurements listed on pages 3–4.

	<i>Casinycteris argynnis</i>	<i>Eidolon helvum</i>	<i>Hypsignathus monstrosus</i>	<i>Lissonycteris angolensis</i>	<i>Megaloglossus woermanni</i>	<i>Micropteropus pusillus</i>	<i>Rousettus aegyptiacus</i>	<i>Stenonycteris lanosus</i>
M	26–33	117–196	112–138	65–100	11–20	20–35	100–166	94–162
FA	49.8–63.5	109–133	207–419	72.3–84.4	38.6–49.4	46.4–55.7	85.7–106.3	85.3–95
ToL	95	140–270	195–275	116–137	60–75	87–92	107–171	127–151
HBL		175–201		114–117	74–80	81–95	130–149	134–148
TaL	0	9–22	0	11–13	0	1–3	7–26	15–25
HF	16	27–35	32–38	17–20	13	14–16	23–25	18–27
TiL	24	10–29	55–59.5	29–31	20.3–21.6	24–25	41–45.5	39–39.7
EL	20–21	27–31	30–32	19–25	15–16	16–18	19–27	21–24
GLS	23.2–28.3	52.2–58.6	56.8–74	39.1–43.8	24.5–30.3	26.8–31	38.3–35.7	39.4–44.8
ZB	17.9–20.4	30.1–35.1	31.6–38.7	22.3–26.7	12.2–14.9	16.7–19.1	24.0–28.9	22.3–26.6
Source	Bergmans, 1990; Thomas, 1910; Andersen, 1912b; Kityo et al., 2009b	Bergmans, 1990; Monadjem et al., 2010b; FMNH	Bergmans, 1989; Monadjem et al., 2010b; Thorn et al., 2009; Andersen, 1912b	Bergmans, 1989; Monadjem et al., 2010b; Thorn et al., 2009	Bergmans, 1997; Thorn et al., 2009; Stanley, 2011; FMNH	Bergmans, 1989; Thorn et al., 2009; FMNH	Bergmans, 1994; Stanley, 2011; FMNH; Andersen, 1912b	Bergmans, 1994; Stanley, 2011; Thorn et al., 2009; Andersen, 1912b

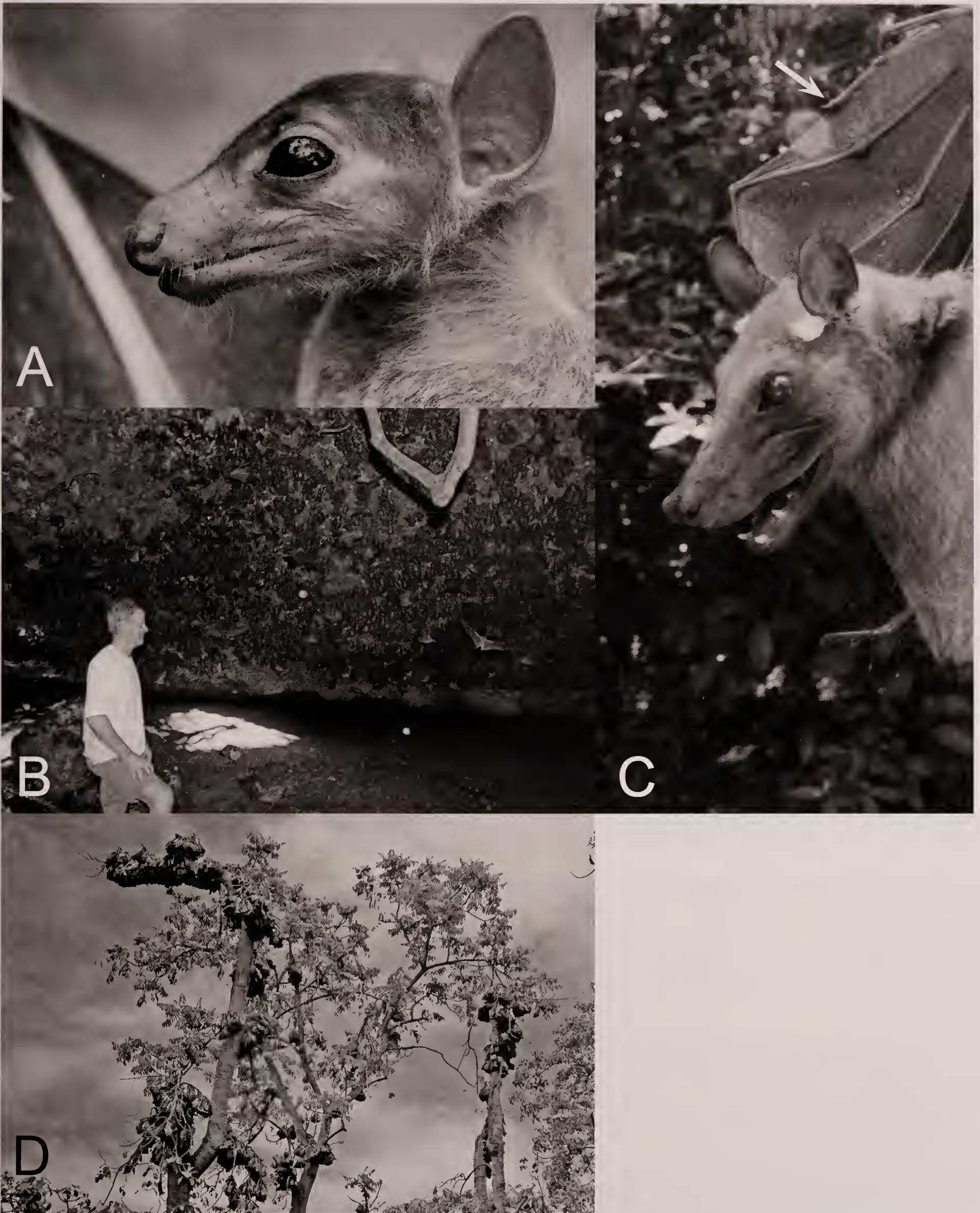


FIG. 4. Pteropodidae, external views and roosts: (A) lateral view of head of *Rousettus aegyptiacus*; (B) senior author with a colony of *Rousettus aegyptiacus* in a sea cave in Watamu; (C) *Epomophorus wahlbergi*, showing the claw at the tip of the second digit (arrow); (D) *Eidolon helvum* in trees near Mbale, Kakamega Forest, Kenya. Photos by B. D. Patterson.

Casinycteris argymnis Thomas, 1910
Golden Short-palated Fruit Bat, Short-palated Fruit Bat

ORIGINAL DESCRIPTION: Thomas (1910: 111).

TYPE LOCALITY: Cameroon, Ja River, Bite, 2000 ft.

DISTRIBUTION: Cameroon and Gabon across Dem. Rep. Congo to S Uganda.

STATUS: Least Concern, population trend unknown.

Eidolon helvum (Kerr, 1792)
African Straw-colored Fruit Bat; Straw-coloured Fruit Bat

ORIGINAL DESCRIPTION: Kerr (1792: xvii, 91).

TYPE LOCALITY: Senegal (restriction by Andersen, 1907).

DISTRIBUTION: Widespread, from Guinea in West Africa to Sudan and Ethiopia in East Africa, south to central Angola in the west and through the woodlands of the east to South Africa, occurring in the north of that country coast to coast.

STATUS: Near Threatened, population trend decreasing.

Hypsignathus monstrosus H. Allen, 1861
Hammer-headed Fruit Bat, Hammer-headed Bat

ORIGINAL DESCRIPTION: Allen (1861: 157).

TYPE LOCALITY: "West Africa," restricted by Andersen (1912b: 506) to "Gaboon."

DISTRIBUTION: Coastal forests in West Africa from Guinea to Cameroon and south to central Angola across much of Dem. Rep. Congo to W Uganda. Isolated populations in E Uganda, W Ethiopia, W Kenya, and N Burkina Faso.

STATUS: Least Concern, population trend unknown.

Lissonycteris angolensis (Bocage, 1898)
Angolan Soft-furred Fruit Bat, Angolan Rousette

ORIGINAL DESCRIPTION: Bocage (1898: 133).

TYPE LOCALITY: Angola, Pungo Andongo, Quibula, and Cahata.

TAXONOMY: This appears to represent a species complex. The taxon *goliath* is now recognized as a distinct species in Mozambique and Zimbabwe (e.g., Monadjem et al., 2010b); the taxa *smithii* (West Africa), *petraea* (Ethiopia), and *ruwenzorii* (Albertine Rift) may also prove separable from *L. angolensis* (but see Bergmans, 1997; Simmons, 2005).

DISTRIBUTION: Interior forests of West Africa from Gambia across Central African Republic and S Sudan to central Ethiopia, south in the east to Mozambique and Zimbabwe, and in the west to central Angola.

STATUS: Least Concern, population trend decreasing.

Megaloglossus woermanni Pagenstecher, 1885
Woermann's Long-tongued Fruit Bat, Woermann's Fruit Bat

ORIGINAL DESCRIPTION: Pagenstecher (1885: 245).

TYPE LOCALITY: Gabon, Ssibange farm.

DISTRIBUTION: Coastal forests in West Africa, ranging from Sierra Leone to central Uganda, south through Gabon and Dem. Rep. Congo to N Angola (see Kityo et al., 2009b).

STATUS: Least Concern, population trend stable.

Micropteropus pusillus (Peters, 1868)
Peters' Lesser Epauletted Fruit Bat, Peters' Dwarf Epauletted Fruit Bat

ORIGINAL DESCRIPTION: Peters (1868b: 870).

TYPE LOCALITY: Nigeria, Yoruba (see discussion in Bergmans, 1989).

DISTRIBUTION: Senegal and Gambia east to S Sudan and W Ethiopia and Kenya; south through Albertine Rift to S Dem. Rep. Congo and N Angola but excluding much of N Dem. Rep. Congo.

STATUS: Least Concern, population trend stable.

Rousettus aegyptiacus (É. Geoffroy, 1810)
Egyptian Rousette, Egyptian Fruit Bat

ORIGINAL DESCRIPTION: Geoffroy Saint-Hilaire (1810a: 96).

TYPE LOCALITY: Egypt, Giza, the Great Pyramid.

DISTRIBUTION: Scattered populations in the Persian Gulf, Arabian Peninsula, and E Mediterranean; African populations along the Egyptian Nile, Ethiopian highlands, most of East Africa south in discontinuous pockets to the Cape. West African populations also broken into pockets in Sierra Leone, Ghana, and coastal forests from Nigeria through central Angola.

STATUS: Least Concern, population trend stable.

Stenonycteris lanosus (Thomas, 1906)
Long-haired Rousette

ORIGINAL DESCRIPTION: Thomas (1906: 137).

TYPE LOCALITY: Uganda, Rwenzori East, 13,000 ft. [3962 m]; amended by Hayman et al. (1966: 30) with "Mubuku Valley."

TAXONOMY: Long considered a species of *Rousettus*, *Stenonycteris lanosus* is consistently recovered in another clade allied to *Myonycteris*, *Lissonycteris*, and *Megaloglossus* (Almeida et al. 2011). Andersen (1912b: 23) coined the name *Stenonycteris* as a subgenus of *Rousettus* for the narrow cheek-teeth and strong braincase deflection of *S. lanosus*.

DISTRIBUTION: Scattered populations in S Ethiopia and S South Sudan and along the Eastern Arc highlands to N Malawi, with main ranges in W Kenya and E Uganda and along Albertine Rift in W Uganda and Rwanda.

STATUS (AS *ROUSETTUS LANOSUS*): Least Concern, population trend decreasing.

Epomophorus crypturus Peters, 1852
Peters' Epauletted Fruit Bat

ORIGINAL DESCRIPTION: Peters (1852: 26).

TYPE LOCALITY: Mozambique, Tete ("East Africa, Ibo Island, 12°20'S").

DISTRIBUTION: Southern Dem. Rep. Congo, Tanzania, Zambia, Malawi, and Mozambique south narrowly along the coast to KwaZulu Natal.

STATUS: Least Concern, population trend unknown.

Epomophorus labiatus (Temminck, 1837)
Little Epauletted Fruit Bat, Ethiopian Epauletted Fruit Bat

ORIGINAL DESCRIPTION: Temminck (1837: 83).

TYPE LOCALITY: Abyssinia (Bergmans, 1988, not Sudan: Sennar as presented in Simmons, 2005).

TABLE 3. Measurements of species of *Epomophorus* recorded from East Africa. Abbreviations and definitions for measurements listed on pages 3–4.

	<i>Epomophorus crypturus</i>	<i>Epomophorus labiatus</i>	<i>Epomophorus minimus</i>	<i>Epomophorus wahlbergi</i>
M	56–139.6	51–99	39–57	54–125
FA	75–88.4	64.8–80.3	53.7–66.7	67.7–94.9
ToL	106–168		98–126	85–211
HBL		108–143	102–105	79–81
TaL	0–5	0–5	0–5	0–4
HF	2–22	18–22	17–19	20
EL	19–28	17–21	19–22	20–31
GLS	44–55.7	36.8–51	31.2–39	41–57.3
ZB	23.5–27.4	20–25.3	17.9–21.6	22.9–29
Source	Monadjem et al., 2010b; Bergmans, 1988; FMNH	Monadjem et al., 2010b; Bergmans, 1988; Thorn et al., 2009	Claessen and de Vree, 1991; Thorn et al., 2009; FMNH	Monadjem et al., 2010b; Bergmans, 1988; Thorn et al., 2009

DISTRIBUTION: South Sudan, E Dem. Rep. Congo, Uganda, and W Kenya south through Zambia to S Malawi; two disjunct populations in Eritrea and Ethiopia and in Chad, Cameroon, and Nigeria.

STATUS: Least Concern, population trend stable.

Epomophorus minimus Claessen and de Vree, 1991

Least Epauletted Fruit Bat, East African Epauletted Fruit Bat

ORIGINAL DESCRIPTION: Claessen and de Vree (1991: 216).

TYPE LOCALITY: Ethiopia, Shewa, Bahadu, 600 m.

TAXONOMY: This species is sometimes confused with *E. minor*, which was synonymized with *E. labiatus* (Claessen & de Vree, 1991).

DISTRIBUTION: Scattered sections of range in Ethiopia, Somalia, Kenya and northernmost Tanzania, and Uganda.

STATUS: Least Concern, population trend stable.

Epomophorus wahlbergi (Sundevall, 1846)

Wahlberg's Epauletted Fruit Bat

ORIGINAL DESCRIPTION: Sundevall (1846: 118).

TYPE LOCALITY: South Africa, Natal, near Durban.

DISTRIBUTION: Cameroon and Gabon south to central Angola, across S Dem. Rep. Congo and Zambia, then north through Uganda, Kenya, and Somalia, south through eastern woodlands along the entirety of the Indian Ocean coast of Africa except for N Mozambique.

STATUS: Least Concern, population trend stable.

TABLE 4. Measurements of species of *Epomops* recorded from East Africa. Abbreviations and definitions for measurements listed on pages 3–4.

	<i>Epomops dobsonii</i>	<i>Epomops franqueti</i>
M	65–158	61–172
FA	80.4–100	76.5–100.9
ToL	137–168	110–150
TaL	0	0
HF	22–26	20–22
EL	25–30	19–28
GLS	45.6–55.3	37.8–53.3
ZB	23.6–26.9	21.2–30
Source	Bergmans, 1989; Monadjem et al., 2010b; Stanley, 2011; FMNH	Bergmans, 1989; Thorn et al., 2009; Monadjem et al., 2010b

Epomops dobsonii (Bocage, 1889)

Dobson's Epauletted Fruit Bat, Dobson's Fruit Bat

ORIGINAL DESCRIPTION: Bocage (1889: 1).

TYPE LOCALITY: Angola, Benguela, Quindumbo.

DISTRIBUTION: A narrow latitudinal band from central Angola across S Dem. Rep. Congo and Zambia to S Tanzania, Malawi, and N Mozambique; isolated populations in Rwanda and central Tanzania.

STATUS: Least Concern, population trend stable.

Epomops franqueti (Tomes, 1860)

Franquet's Epauletted Fruit Bat

ORIGINAL DESCRIPTION: Tomes (1860: 54).

TYPE LOCALITY: Gabon.

DISTRIBUTION: Found along the Gulf of Guinea from Côte d'Ivoire to N Angola, across S Central African Republic and all of the Dem. Rep. Congo to Uganda and NW Zambia.

STATUS: Least Concern, population trend stable.

TABLE 5. Measurements of species of *Myonycteris* recorded from East Africa. Abbreviations and definitions for measurements listed on pages 3–4.

	<i>Myonycteris relicta</i>	<i>Myonycteris torquata</i>
M	48	27–60
FA	65.9–75.1	54.9–67.1
ToL	124	94–111
HBL		100–102
TaL	8.3–9	4–12
HF		14–15
EL	20–22	18
TiL	26.7–29.3	23
GLS	35.5–39.2	30.2–35.8
ZB	21.4	18.2–21.6
Source	Bergmans, 1980, 1997	Bergmans, 1980, 1997; Thorn et al., 2009; Stanley, 2011

Myonycteris relicta Bergmans, 1980

Bergmans' Collared Fruit Bat, East African Little Collared Fruit Bat

ORIGINAL DESCRIPTION: Bergmans (1980: 173).

TYPE LOCALITY: Kenya, Coast, Shimba Hills, Lukore area, Mukanda River.

DISTRIBUTION: Narrowly distributed in SE Kenya and in coastal Tanzania to the southern border; individual records from E Zimbabwe and central Mozambique (Monadjem et al., 2010a).

STATUS: Vulnerable (A4c), population trend decreasing.

***Myonycteris torquata* (Dobson, 1878)**
Little Collared Fruit Bat

ORIGINAL DESCRIPTION: Dobson (1878: 71, 76).

TYPE LOCALITY: Angola.

DISTRIBUTION: A West African cluster from Guinea and Sierra Leone to Nigeria, and a Central African cluster from Cameroon and Central African Republic south to N Angola and east to central Uganda.

STATUS: Least Concern, population trend stable.

TABLE 6. Measurements of species of *Pteropus* recorded from East Africa. Abbreviations and definitions for measurements listed on pages 3–4.

	<i>Pteropus seychellensis</i>	<i>Pteropus voeltzkowi</i>
M	400–650	430–610
FA	147.1–157	145.6–163
HBL	224–231	240–265
EL	31–32	21–23
GLS	65.2–68.2	62.8–68
ZB	35.1–39.3	32.7–38
Source	Bergmans, 1990; Stanley, 2011	Bergmans, 1990; Stanley, 2011

***Pteropus seychellensis* Milne-Edwards, 1877**
Seychelles Flying Fox

ORIGINAL DESCRIPTION: Milne-Edwards (1877: 221).

TYPE LOCALITY: Seychelle Islands [Mahe Island].

DISTRIBUTION: Isolated populations on the Indian Ocean islands of the Seychelles, Comoros, and Mafia Island (Tanzania).

STATUS: Least Concern, population trend stable.

***Pteropus voeltzkowi* Matschie, 1909**
Pemba Flying Fox

ORIGINAL DESCRIPTION: Matschie (1909: 486).

TYPE LOCALITY: Tanzania, Pemba Island, Fufuni.

DISTRIBUTION: Restricted to Pemba Island off N Tanzania.

STATUS: Vulnerable (D2), population trend increasing.

Rhinolophidae

Horseshoe bats feed on flying insects and occur throughout tropical and temperate habitats of the Old World. Although the family separated from its sister Hipposideridae an estimated 28.7 million years ago, it is known from only two genera: an extinct one, *Paleonycteris* (McKenna & Bell, 1997), and the extant *Rhinolophus*. Of the 74 species of *Rhinolophus* thus far named and recognized by IUCN (2011), 14 occur in East Africa. The genus has been skillfully monographed by Csorba et al. (2003), who figured skulls, teeth, and other diagnostic features of all species. The rhinolophid noseleaf is structurally among the most varied and complicated nasal

features in mammals; its structure serves to diagnose many otherwise similar species (Fig. 5). The following key was modified from Csorba et al. (2003), using Stanley (2011) and Thorne et al. (2009).

- 1 Anterior upper premolar fully external and small or missing . . . 2
- 1' Anterior upper premolar in tooththrow or at most half-external 7
- 2 Sella hairy; connecting process low, forming a continuous arch; general color grayish *fumigatus* group, 3
- 2' Sella naked; connecting process high, bluntly rounded; general coloration not grayish . . . *ferrumequinum* group, 5
- 3 FA > 61 mm; third metacarpal > 42 mm; breadth of horseshoe 12–15 mm; dark brown *Rhinolophus hildebrandtii*
- 3' FA < 61 mm; third metacarpal < 42 mm; breadth of horseshoe < 11 mm; fur paler 4
- 4 GLS > 24.5 mm; breadth of horseshoe 11 mm. *Rhinolophus eloquens*
- 4' GLS < 24.5 mm; breadth of horseshoe 9.0–10.2 mm. *Rhinolophus fumigatus*
- 5 Connecting process high, pointed or rounded. *Rhinolophus clivosus*
- 5' Connecting process lower, rounded. 6
- 6 Horseshoe width > 9 mm; GLS > 22 mm *Rhinolophus deckenii*
- 6' Horseshoe width < 9 mm; GLS < 21 mm *Rhinolophus darlingi*
- 7 Sella widening at base; anterior median swellings bulbous. . . 8
- 7' Sella normal; anterior median swellings moderate. 10
- 8 Connecting process very low; internarial septum expanded into a cup-like structure; lancet long, narrow terminally, and blunt *maclaudi* group, 9
- 8' Connecting process well developed; internarial septum not expanded; tip of lancet short, broad, with nearly straight sides. *Rhinolophus maendeleo*
- 9 Larger (FA > 55 mm; GLS > 24 mm) *Rhinolophus ruwenzorii*
- 9' Smaller (FA < 55 mm; GLS < 24 mm) *Rhinolophus hilli*
- 10 Connecting process triangular in profile . . . *landeri* group, 11
- 10' Connecting process rounded in profile. *capensis* group, 13
- 11 Sella wedge-shaped, connecting process narrow and sharply pointed. *Rhinolophus blasii*
- 11' Sella broadly rounded above, connecting process a broad-based triangle 12
- 12 Larger (FA 49–54 mm; GLS > 21 mm) *Rhinolophus alcyone*
- 12' Smaller (FA < 49 mm; GLS < 19.3 mm) *Rhinolophus landeri*
- 13 Sella broad, horseshoe width 7.0–8.3 mm, almost covering muzzle; EL 18–24 mm; CIL 17.2–19.2 mm *Rhinolophus simulator*
- 13' Sella narrow, horseshoe width 6.8–7.4 mm, not covering muzzle; EL 15–20 mm; CIL 15.1–16 mm. *Rhinolophus swinnyi*

***Rhinolophus alcyone* Temminck, 1853**
Halcyon Horseshoe Bat

ORIGINAL DESCRIPTION: Temminck (1853: 80).

TYPE LOCALITY: Ghana, Boutry River.

DISTRIBUTION: West Africa from Senegal to Togo, and Central Africa from S Nigeria to S South Sudan and E Uganda, including N Dem. Rep. Congo and most of Congo; also Bioko (Equatorial Guinea).

STATUS: Least Concern, population trend unknown.

***Rhinolophus blasii* Peters, 1867**

Blasius's Horseshoe Bat, Blasius' Horseshoe Bat

ORIGINAL DESCRIPTION: Peters (1867a: 17).

TYPE LOCALITY: SE Europe; restricted to Italy by Ellerman et al. (1953: 59).

DISTRIBUTION: Highly disjunct range in NW Africa (Barbary Coast), S Europe, Iran and Afghanistan, the Levant, and the Arabian Peninsula; scattered populations in Ethiopia and Somalia, E Zambia, Malawi and S Tanzania, Zimbabwe and Mozambique, and in pockets of E South Africa.

STATUS: Least Concern, population trend decreasing.

***Rhinolophus clivosus* Cretzschmar, 1828**

Geoffroy's Horseshoe Bat

ORIGINAL DESCRIPTION: Cretzschmar (1828: 47).

TYPE LOCALITY: Saudi Arabia, Red Sea Coast, Muwaylih (= Mohila).

DISTRIBUTION: Scattered populations on the Arabian Peninsula and Mediterranean coast, isolated Saharan Mountains, Ethiopia, Eritrea, and Somalia, W and central Kenya, a narrow band along the Albertine Rift, S Dem. Rep. Congo, and woodland habitats from Malawi and E Zambia south to the Cape and north to S Angola (but not in the Karoo, Kalahari, or Namib deserts).

STATUS: Least Concern, population trend unknown.

***Rhinolophus darlingi* K. Andersen, 1905**

Darling's Horseshoe Bat

ORIGINAL DESCRIPTION: Andersen (1905: 70).

TYPE LOCALITY: Zimbabwe, Mazoe, 4000 ft.

DISTRIBUTION: SE Africa, from S Malawi and Mozambique through Zimbabwe, E Botswana, and the northern half of South Africa, with isolated records in N Tanzania (Serengeti) and Nigeria; records in the northern Cape, Namibia, and Angola may correspond to a distinct species (see Monadjem et al., 2010b).

STATUS: Least Concern, population trend unknown.

***Rhinolophus deckenii* Peters, 1868**

Decken's Horseshoe Bat

ORIGINAL DESCRIPTION: Peters (1868a: 705).

TYPE LOCALITY: Tanzania, "Zanzibar coast" (mainland opposite Zanzibar).

DISTRIBUTION: W Uganda, SE coastal Kenya, and coastal Tanzania, including Zanzibar and Pemba, south to central Mozambique (Monadjem et al., 2010a).

STATUS: Near Threatened, population trend decreasing.

***Rhinolophus eloquens* K. Andersen, 1905**

Eloquent Horseshoe Bat

ORIGINAL DESCRIPTION: Andersen (1905: 74).

TYPE LOCALITY: Uganda, Entebbe.

DISTRIBUTION: S South Sudan, E Dem. Rep. Congo, Uganda, Rwanda, and W, S, and coastal Kenya, Somalia, and Zanzibar and Pemba.

STATUS: Least Concern, population trend unknown.

***Rhinolophus fumigatus* Rüppell, 1842**

Rüppell's Horseshoe Bat

ORIGINAL DESCRIPTION: Rüppell (1842: 132).

TYPE LOCALITY: Ethiopia, Shoa.

DISTRIBUTION: Sahel woodlands from Senegal to Eritrea and central Ethiopia, south through W and S Kenya, Tanzania, Malawi, Zambia, W Mozambique, N Zimbabwe, NE South Africa, S Angola, N Botswana, and the length of central Namibia.

STATUS: Least Concern, population trend unknown.

***Rhinolophus hildebrandtii* Peters, 1878**

Hildebrandt's Horseshoe Bat

ORIGINAL DESCRIPTION: Peters (1878: 195).

TYPE LOCALITY: Kenya, Eastern, Taita, Ndi.

TAXONOMY: This species complex is currently being revised by Peter Taylor and colleagues (P. Taylor, pers. comm.).

DISTRIBUTION: Highlands of S Ethiopia, Uganda, W and S Kenya, Rwanda, Burundi, Tanzania, Malawi, W Mozambique, Zambia, Zimbabwe, and NE South Africa; isolated populations in Nigeria and coastal Mozambique.

STATUS: Least Concern, population trend unknown.

***Rhinolophus hilli* Aellen, 1973**

Hill's Horseshoe Bat

ORIGINAL DESCRIPTION: Aellen (1973: 101).

TYPE LOCALITY: Rwanda, Cyangugu, Uwinka, 2512 m.

DISTRIBUTION: SW Rwanda.

STATUS: Critically Endangered B1ab(iii,v)+2ab(iii,v), population trend decreasing.

***Rhinolophus landeri* Martin, 1838**

Lander's Horseshoe Bat

ORIGINAL DESCRIPTION: Martin (1838: 101).

TYPE LOCALITY: Equatorial Guinea, Bioko.

DISTRIBUTION: Widespread from Senegal and Gambia to Ethiopia and Somalia, south to NE South Africa, including Zanzibar.

STATUS: Least Concern, population trend unknown.

***Rhinolophus maendeleo* Kock, Csorba, and Howell, 2000**

Maendeleo Horseshoe Bat

ORIGINAL DESCRIPTION: Kock et al. (2000: 234).

TYPE LOCALITY: Tanzania, Tanga, 2.5 km W of Tanga, Mkulumuzi River Gorge, Amboni Cave Forest.

DISTRIBUTION: Disjunct populations in NE and central Tanzania and N Mozambique.

STATUS: Data Deficient, population trend unknown.

TABLE 7. Measurements and identification features of species of *Rhinolophus* recorded from East Africa. Abbreviations and definitions for measurements listed on pages 3–4.

	<i>Rhinolophus alcyone</i>	<i>Rhinolophus blasii</i>	<i>Rhinolophus clivosus</i>	<i>Rhinolophus darlingi</i>	<i>Rhinolophus deckenii</i>	<i>Rhinolophus eloquens</i>	<i>Rhinolophus fumigatus</i>
M	6–22	7–12	12–26.1	6–14	15	21.5	11–20
FA	49.4–58	44–47.7	48–60	43–52.9	48–56	53–63	46.5–58.6
ToL	70–105	62–90	74–113	69–99	84–94	88–117	89–106
HBL	54–70	52–62	55–67		63–64	69–77	50–65
TaL	18–33	19–32	20–39	24–35	26–29.3	20–45	29–40
HF	13–15	10–11	9–12		12–14	14–15	10–12
EL	20–24	17–21	15–24	15–22	20–25	14–38	23–29
TiL	19–32	21–22	21.8–23.3		25.8–28	23.6–26.2	23.9–24.6
CIL	18.6–21.7	16.3–17.7	18.4–21.4	17–19.1	19.6	22.5–28.7	19.4–23
GLS	22–23.9	18.17–19.98	21.2–22.7	18.43–20.5	22.56–24.12	23.5–25.6	21.9–23.6
ZB	11.1–12.4	8.09–9.88	11.1–11.7	9.7–10.66	11.45–12.64	12.4–12.8	11.3–12.2
Horseshoe width	8.8–10.5	6.6–9	5.6–8.3	< 8.5	9–11	11	9–10.2
D3 metacarpal length	34.8–40.2	28.5–33.5	27–41	28.5–35	37	39.8–42	34.5–42.5
Dorsal color	deep brown (or rufous)	light brown or yellowish brown	grayish or reddish brown	drab gray or gray-brown	grayish dull brown	wood brown	grayish brown
Ventral color	nearly as dark as the back	white or creamy	pale grayish brown	much paler	paler	paler	light gray
Axillary tufts in males	yes	no	no	no	no	no	no
Source	Monadjem et al., 2010b; Thorn et al., 2009; Rosevear, 1965; Csorba et al., 2003	Monadjem et al., 2010b; Csorba et al., 2003; FMNH	Monadjem et al., 2010b; Thorn et al., 2009; Csorba et al., 2003; FMNH	Monadjem et al., 2010b; Csorba et al., 2003	Monadjem et al., 2010b; Csorba et al., 2003; FMNH	Monadjem et al., 2010b; Thorn et al., 2009; Csorba et al., 2003; FMNH	Monadjem et al., 2010b; Thorn et al., 2009; Rosevear, 1965; Csorba et al., 2003; FMNH

***Rhinolophus ruwenzorii* J. Eric Hill, 1942**
Ruwenzori Horseshoe Bat

ORIGINAL DESCRIPTION: Hill (1942: 1–2).

TYPE LOCALITY: Dem. Rep. Congo, Kivu, W slope of Mount Ruwenzori, S side Buhatu Valley, 7500 ft. (2500 m).

DISTRIBUTION: Albertine Rift mountains of N Rwanda, E Dem. Rep. Congo, and W Uganda.

STATUS: Vulnerable B1ab(ii,iii,iv,v), population trend decreasing.

***Rhinolophus simulador* K. Andersen, 1904**
Bushveld Horseshoe Bat

ORIGINAL DESCRIPTION: Andersen (1904: 384).

TYPE LOCALITY: Zimbabwe, Mazoe.

DISTRIBUTION: Central Ethiopia, Kenya, E Uganda, Tanzania, Malawi, Zambia, Zimbabwe, Mozambique, E South Africa, Swaziland, and S Botswana; isolated populations in central Nigeria and W Cameroon.

STATUS: Least Concern, population trend decreasing.

***Rhinolophus swinnyi* Gough, 1908**
Swinny's Horseshoe Bat

ORIGINAL DESCRIPTION: Gough (1908: 72).

TYPE LOCALITY: South Africa, Cape, Pondoland, Ngqeleni District.

DISTRIBUTION: Interior woodlands from highlands of S Tanzania, Malawi, Zambia, and S Dem. Rep. Congo, Zimbabwe, south to South African coast S of Lesotho; isolated population in Zanzibar.

STATUS: Least Concern, population trend unknown.

Hipposideridae

Sister to the Rhinolophidae, the Old World leaf-nosed bats also feed on flying insects in tropical and temperate forests of the Old World. They differ from horseshoe bats in the form of the noseleaf, the foot, the absence of the lower small premolar, and the structure of the hip and shoulder girdles (Nowak, 1999; Fig. 6). There are nine genera and 84 extant species, of which four genera and 13 species occur in East Africa (IUCN, 2011). Ten species of the widespread genus *Hipposideros* account for most African diversity, along with three other genera represented by a single species each. *Clootis* is monotypic and endemic to Africa, whereas *Asellia* and *Triaenops* range from Africa into Southwest Asia and contain two and four species, respectively. The key is modified from Stanley (2011) and Hayman and Hill (1971).

- 1 Posterior leaflet on noseleaf simple in outline, elliptical or rounded, not tridentate; ears separate or united by band; small upper premolar present (except in *H. megalotis*); FA 35–124 mm) *Hipposideros*, 4
- 1' Posterior leaflet of noseleaf tridentate; ears always separate; small upper premolar present or absent; FA 31–54 mm 2
- 2 Tip of tail projecting up to 7 mm beyond edge of uropatagium; ears large (18–20 mm), pointed; small upper premolar lacking *Asellia tridens*
- 2' Tail not projecting from uropatagium; ears variable; small upper premolar present 3
- 3 Size very small (FA 31–35 mm); noseleaf small and inconspicuous; ears short and rounded; thumbs minute; zygoma typically shaped, not expanded. *Clootis percivali*

TABLE 7. Extended.

<i>Rhinolophus hildebrandtii</i>	<i>Rhinolophus hilli</i>	<i>Rhinolophus landeri</i>	<i>Rhinolophus maendeleo</i>	<i>Rhinolophus ruwenzorü</i>	<i>Rhinolophus simulator</i>	<i>Rhinolophus swiui</i>
20–38.5	16.5	6–10	15.5	16–19.5	5.8–11	5–8.3
58.4–67	54.2–54.3	42–47.8	48.2–49.9	55–61.7	42–49	37–44.5
101–126	92	70–80	69–74	83–104	61–88	53–76
76–89		43–60				
30–47	29.3	21–30	23–25	25–34	18–36	15–29
18–20	12.2	10	8.0–8.2	11–14.5	11–14.5	
26–35	28.5	15–20	24–24	28–38	18.9	13–20
25.7–28.5	23.8	16.5–22	18.9–19.4	21.7–26	16.2–17.8	
22.5–25.9		15.2–17.5	19.9		17.27–19.25	15.1–16
26.06–28.67	23.3–23.89	18.1–21	20.64–20.75	24.2–26.37	8.51–9.32	17–18.18
12.62–14.95	10.6–10.9	9.0–9.6	9.35–9.37	10.5–11.4	8.9–9.2	8.25–9.04
12–15	12	6–7.8	8.2–8.4	12–13	7.0–8.3	6.8–7.4
42.3–48	37.5	28.3–33	32.1–34.6	37.5–40	29–33	27.8–31.8
grayish brown	dark brown	buff-brown or reddish brown	brownish	uniform dark brown	dark brown	pale gray to pale brown
grayish brown or slightly paler	dark brown	paler	beige, white on abdomen	uniform dark brown	grayish white	off-white or cream
no	no	yes	no	no	no	no
Monadjem et al., 2010b; Csorba et al., 2003; FMNH	Aellen, 1973	Monadjem et al., 2010b; Thorn et al., 2009; Rosevear, 1965; Csorba et al., 2003	Monadjem et al., 2010b; Kock et al., 2000; Csorba et al., 2003	Fahr et al., 2002; Csorba et al., 2003	Monadjem et al., 2010b; Csorba et al., 2003; Ansell, 1986	Monadjem et al., 2010b; Csorba et al., 2003

3'	Size larger (FA 45–54 mm); conspicuous noseleaf; short but pointed ears (10–14 mm); normal thumbs; zygoma expanded into broad plate <i>Triaenops persicus</i>	9'	Two secondary lateral leaflets alongside noseleaf; FA 41–64 mm; frontal gland present or absent 10
4	Size very small (FA 34–38 mm); ears very large (>50% FA), linked at base by low fold across crown; small upper premolar absent <i>Hipposideros megalotis</i>	10	Size larger (at least in East African populations), FA 59–64 mm; frontal gland absent <i>Hipposideros fuliginosus</i>
4'	Size larger (FA > 40 mm); ears smaller, not conjoined by integumentary fold; small upper premolar present 5	10'	Size smaller (FA 41–58 mm); frontal gland present in males, opening horizontally 11
5	Central and posterior noseleaves each bearing a median club-shaped process; size large (FA 59–76 mm); ears narrow and pointed; prominent frontal gland in both sexes; dark woolly pelage distinctively frosted with gray tips 6	11	Size smaller (FA 41–44 mm, rarely to 47); tail short (19–25 mm); pelage and facial skin dark gray <i>Hipposideros beatus</i>
5'	Noseleaf without club-shaped processes; size varied (FA 40–124 mm); ears variable, frontal gland variably present; pelage not dark woolly and frosted with gray 7	11'	Size larger (FA 44–58 mm); tail longer (>30 mm); pelage and facial skin paler gray or reddish 12
6	Smaller (FA 59–71 mm); antorbital foramen relatively large <i>Hipposideros cyclops</i>	12	FA usually < 50 mm; pelage grayish (pale orange in bright phase); median posterior narial compartment narrow, with wide lateral inflations <i>Hipposideros caffer</i>
6'	Larger (FA 74–76 mm); antorbital foramen relatively small <i>Hipposideros camerunensis</i>		
7	Size very large (FA 79–115 mm); ears very narrow and pointed; frontal gland in both sexes, opening by a vertical slit 8		
7'	Size moderate (FA 40–66 mm); ears broader and more rounded; frontal gland varied 9		
8	Plagiopatagium and uropatagium uniformly dark; dorsal pelage darker with little or no contrast in dorsal coloration <i>Hipposideros gigas</i>		
8'	Uropatagium, legs, and sometimes skin of forearms distinctly paler than plagiopatagium; dorsal coloration marked by contrasts, with a darker dorsal vest bordered in front, back, and ventrally by whitish markings, being purest white or cream in the armpit <i>Hipposideros vittatus</i>		
9	Three secondary lateral leaflets alongside noseleaf; FA 58–66 mm; frontal gland in both sexes <i>Hipposideros abae</i>		

TABLE 8. Measurements for genera of Hipposideridae represented in East Africa by single species. Abbreviations and definitions for measurements listed on pages 3–4.

	<i>Asellia trideus</i>	<i>Cloeotis percivali</i>	<i>Triaenops persicus</i>
M	6–10	3.6–6	10–13
FA	45–52	30–36	48.2–59
ToL	66–90	56–73	88–103
HBL	50–62	33–50	62–66
TaL	18–25	18–36	27–37
HF	9–10	7–7.5	8–10
EL	20–21.0	7–10	12–16
CIL		11.1–12	16.6–18.3
GLS	18.0–19.2		19.5–21.2
ZB	9.8–11.0	7.2–7.5	9–9.8
Source	Stanley, 2011; Harrison, 1957; Nowak, 1999; Baker et al., 1974; DeBlase, 1980	Monadjem et al., 2010b; Stanley, 2011; Ansell, 1986	Monadjem et al., 2010b; Thorn et al., 2009



FIG. 5. Front and side views of the head of *Rhinolophus clivosus*, illustrating the morphology of the noseleaf and the terminology used to describe it. Abbreviations: cl, cells of the lancet; cp, connecting process; ho, horseshoe; ic, internarial cup; la, lancet; me, median emargination; no, nostril; s, sella; tl, tip of the lancet; ts, tip of the sella. Photos by B. D. Patterson.

12' FA usually > 50 mm; pelage brownish (rufous in bright phase); median posterior narial compartment wide, with narrow lateral inflations. *Hipposideros ruber*

***Asellia tridens* (É. Geoffroy, 1813)
Geoffroy's Trident Leaf-nosed Bat**

ORIGINAL DESCRIPTION: Geoffroy Saint-Hilaire (1813: 265).
TYPE LOCALITY: Egypt (Qena, near Luxor).

DISTRIBUTION: Deserts from SW Pakistan and W Afghanistan through the Levant, entire Arabian Peninsula, much of Saharan Africa (excluding the Barbary Coast and N Libya), south to Senegal, Mali, Niger, N Chad, Sudan, Ethiopia, and Somalia. A single unconfirmed specimen records this species from the Laikipia Plateau in Kenya.

STATUS: Least Concern, population trend stable.

***Cloeotis percivali* Thomas, 1901
Percival's Short-eared Trident Bat, Percival's Trident Bat**

ORIGINAL DESCRIPTION: Thomas (1901d: 28).
TYPE LOCALITY: Kenya, Coast, Takaungu, north of Mombasa.

DISTRIBUTION: Isolated populations on coast of Kenya, Mafia Island (Tanzania), S Dem. Rep. Congo, N Mozambique, S Zambia, Zimbabwe, SE Botswana, Swaziland, and the Transvaal of South Africa.

STATUS: Least Concern, population trend unknown.

***Triaenops persicus* Dobson, 1871
Persian Trident Bat**

ORIGINAL DESCRIPTION: Dobson (1871: 455).
TYPE LOCALITY: Iran, Shiraz, 4750 ft.

DISTRIBUTION: Highly fragmented range from Pakistan, Iran, Oman, and Yemen to Djibouti, Somalia, the Rift Valley of Ethiopia and Kenya to the Indian Ocean coast of Kenya and Tanzania, on Zanzibar and in N Mozambique, S Malawi, and E Zimbabwe.

STATUS: Least Concern, population trend unknown.

***Hipposideros abae* J. A. Allen, 1917
Aba Leaf-nosed Bat, Aba Roundleaf Bat**

ORIGINAL DESCRIPTION: Allen et al. (1917: 432).
TYPE LOCALITY: Dem. Rep. Congo, Oriental, Aba.
DISTRIBUTION: West African forests from Guinea-Bissau to SW South Sudan, N Dem. Rep. Congo, and NW Uganda.
STATUS: Least Concern, population trend unknown.

***Hipposideros beatus* K. Andersen, 1906
Benito Leaf-nosed Bat**

ORIGINAL DESCRIPTION: Andersen (1906a: 279).
TYPE LOCALITY: Equatorial Guinea, Rio Muni, 15 mi. (24 km) from Benito River.
DISTRIBUTION: Narrowly distributed in coastal West Africa (Sierra Leone to Togo) and in Central Africa (W Nigeria to Gabon, across N Dem. Rep. Congo to S South Sudan and W Uganda); see Thorn et al. (2009).
STATUS: Least Concern, population trend decreasing.

***Hipposideros caffer* (Sundevall, 1846)
Sundevall's Leaf-nosed Bat, Sundevall's Roundleaf Bat**

ORIGINAL DESCRIPTION: Sundevall (1846: 118).
TYPE LOCALITY: South Africa, Natal, near Durban.
TAXONOMY: This name is currently applied to a complex of species with deep internal divergences (Vallo et al., 2008).

TABLE 9. Measurements and identification features of species of *Hipposideros* recorded from East Africa. Abbreviations and definitions for measurements listed on pages 3–4.

	<i>Hipposideros abae</i>	<i>Hipposideros beatus</i>	<i>Hipposideros caffer</i>	<i>Hipposideros camerunensis</i>	<i>Hipposideros cyclops</i>	<i>Hipposideros fuliginosus</i>	<i>Hipposideros gigas</i>	<i>Hipposideros megalotis</i>	<i>Hipposideros ruber</i>	<i>Hipposideros vittatus</i>
M		10–11	5–11	40–44	20–56	18–20	74–180	5	9–11	52–180
FA	55–64	41–49	40–51	74–76	60.6–74	56–64	98–124	35–38	48–58	79–116
ToL	107	77–82	66–94		98–133	88–94	135–171	63–72	90–94	108–162
HBL	58–70	42–54	42–48	93–97	72–95	62–70	88–126	35.2	42–48	88–126
TaL	30–40	24–31	21–39	26–32	20–40	26–40	30–45	25–28	26–39	27–45
HF	11–13	7–10	8–10	23–29	18–23	13–14		6–7	9–10	
EL	20–22.5	13–18	10–18	33–36	27–38	14–18	28–32	18.2	14–18	24–32
TiL	26–28.5	15–16.5	15.6–21.7	34–37	28.9–36	21–26	42–46	18.2	20.4–24.5	37–40
GLS	21.9–23.7	17.5–18		30–30.7	26.3–30	23–23.4		14.2		31.1–37.8
CIL			14.6–16.5				34–37		16.2–16.7	27.8–32.7
ZB	13–14.5	8.5–10.5	8.9–11.2	15.5–16.5	14.2–16.3	11.9–12.9	18.6–20.7	6.9–7.0		18
Skull length to canines	23–24.1	15.8–16.8	16.7–20	30.5–31	26.7–29.7	21–23.2	34–37			
Band of integument uniting ears at base	no	no	no	no	no	no	no	yes	no	no
Source	Rosevear, 1965; Thorn et al., 2009; FMNH	Rosevear, 1965; Thorn et al., 2009; FMNH	Monadjem et al., 2010b; Rosevear, 1965; Stanley, 2011	Decher and Fahr, 2005; Rosevear, 1965; Thorn et al., 2009	Decher and Fahr, 2005; Rosevear, 1965; Thorn et al., 2009	Rosevear, 1965; Thorn et al., 2009; Monadjem et al., 2010b	Monadjem et al., 2010b; Rosevear, 1965; Stanley, 2011	Hill, 1963; Gaucher and Brosset, 1990; FMNH	Monadjem et al., 2010b; Stanley, 2011	Andersen, 1906b; Monadjem et al., 2010b; Stanley, 2011

DISTRIBUTION: Widespread but scattered populations in SW Arabian Peninsula, Morocco, E South Sudan, Eritrea and Ethiopia, Somalia, Kenya, and S South Sudan south to the Transvaal (also Zanzibar and Pemba, but excluding much of Tanzania). In West Africa, from Senegal to Nigeria and then scattered populations in Cameroon, Gabon, Dem. Rep. Congo, and Angola through N Namibia.

STATUS: Least Concern, population trend decreasing.

***Hipposideros camerunensis* Eisentraut, 1956**
Cameroon Leaf-nosed Bat, Greater Roundleaf Bat

ORIGINAL DESCRIPTION: Eisentraut (1956: 526).

TYPE LOCALITY: Cameroon, Buea.

DISTRIBUTION: Isolated populations at the type locality in coastal Cameroon, E Dem. Rep. Congo, Uganda, and W Kenya.

STATUS: Data Deficient, population trend unknown.

***Hipposideros cyclops* (Temminck, 1853)**
Cyclops Leaf-nosed Bat, Cyclops Roundleaf Bat

ORIGINAL DESCRIPTION: Temminck (1853: 75).

TYPE LOCALITY: Ghana, Boutry River.

DISTRIBUTION: From Senegal and Guinea-Bissau across coastal West Africa south to Congo River Delta and east to the Albertine Rift mountains from S South Sudan to N Burundi. Isolated populations in Kampala, near Mount Elgon, and on the coast of S Kenya and N Tanzania; also on Bioko (Equatorial Guinea).

STATUS: Least Concern, population trend decreasing.

***Hipposideros fuliginosus* (Temminck, 1853)**
Sooty Leaf-nosed Bat

ORIGINAL DESCRIPTION: Temminck (1853: 77).

TYPE LOCALITY: Ghana, coast.

DISTRIBUTION: Two disjunct populations, one in West Africa from Sierra Leone to Ghana, and another in Central Africa, in Cameroon and Gabon, N Dem. Rep. Congo, and W Uganda.

STATUS: Least Concern, population trend decreasing.

***Hipposideros gigas* (Wagner, 1845)**
Giant Leaf-nosed Bat

ORIGINAL DESCRIPTION: Wagner (1845: 148).

TYPE LOCALITY: Angola, Benguela.

DISTRIBUTION: A West and Central African range from Senegal to the Central African Republic south through central Dem. Rep. Congo; disjunct ranges in SE Kenya and NE Tanzania and in coastal Angola, with isolated populations in Tanzania, S Dem. Rep. Congo, and Bioko.

STATUS: Least Concern, population trend unknown.

***Hipposideros megalotis* (Heuglin, 1861)**
Large-eared Leaf-nosed Bat, Ethiopian Large-eared Roundleaf Bat

ORIGINAL DESCRIPTION: Heuglin (1861: 4, 8).

TYPE LOCALITY: Eritrea, Bogos Land, Keren.

DISTRIBUTION: Red Sea coast of Saudi Arabia, Eritrea, and Djibouti through central Ethiopia to Rift Valley and Central Highlands of Kenya.

STATUS: Least Concern, population trend unknown.



FIG. 6. Hipposideridae, external views: (A) *Hipposideros vittatus* female, showing narrow pointed ears, well-developed mammae, and pelvic nipples used by young as holdfast structures; (B) detail of head of male *H. vittatus* showing the vertical orientation of the frontal organ; (C) *Hipposideros ruber*, with rounded ear pinnae. Photos by B. D. Patterson.

***Hipposideros ruber* (Noack, 1893)**
Noack's Leaf-nosed Bat, Noack's Roundleaf Bat

STATUS: Near Threatened, population trend decreasing.

ORIGINAL DESCRIPTION: Noack (1893: 586).
 TYPE LOCALITY: Tanzania, Eastern, "Lugerrunjere" (= Ngerengere) River.
 TAXONOMY: This name is currently applied to forms that appear to represent two or more cryptic species (Vallo et al., 2011a).
 DISTRIBUTION: Widespread in West and Central Africa from Senegal and Gambia to W Ethiopia, south through Uganda and S Kenya to Mozambique, Malawi, N Zambia, and N Angola.
 STATUS: Least Concern, population trend unknown.

***Hipposideros vittatus* (Peters, 1852)**
Striped Leaf-nosed Bat

ORIGINAL DESCRIPTION: Peters (1852: 32).
 TYPE LOCALITY: Mozambique, Cap Delgado group, Ibo Island.
 DISTRIBUTION: A disjunct Sahelian range from N Nigeria to N Central African Republic. Main range from Ethiopia, S Somalia, SE Kenya, Tanzania (also Pemba and Zanzibar islands), Malawi, Mozambique, Zambia, Zimbabwe, N Botswana, S Dem. Rep. Congo, Angola, and N Namibia; also on Guinea-Bissau.

Megadermatidae

This family of four extant genera and five species inhabits the Palearctic of Africa, southern Asia, and Australia. Two genera and two species occur in Africa, and both occur in East Africa. Megadermatids are characterized by large erect ears united at their base by a fold of skin, a divided tragus, a prominent noseleaf, and they lack upper incisors (Fig. 7). They feed on insects and small vertebrates gleaned from surfaces. The key is adapted from Stanley (2011).

- 1 Noseleaf longer than 15 mm, blunt on tip; tragus > 50% EL..... *Lavia frons*
- 1' Noseleaf shorter than 15 mm, rounded on tip; tragus < 50% EL..... *Cardioderma cor*

***Cardioderma cor* (Peters, 1872)**
Heart-nosed Bat

ORIGINAL DESCRIPTION: Peters (1872a: 194).
 TYPE LOCALITY: Ethiopia.
 DISTRIBUTION: From Eritrea and adjacent Sudan through all of Somalia, E and central Ethiopia, and Kenya, SE South Sudan, E Uganda, and N Tanzania.

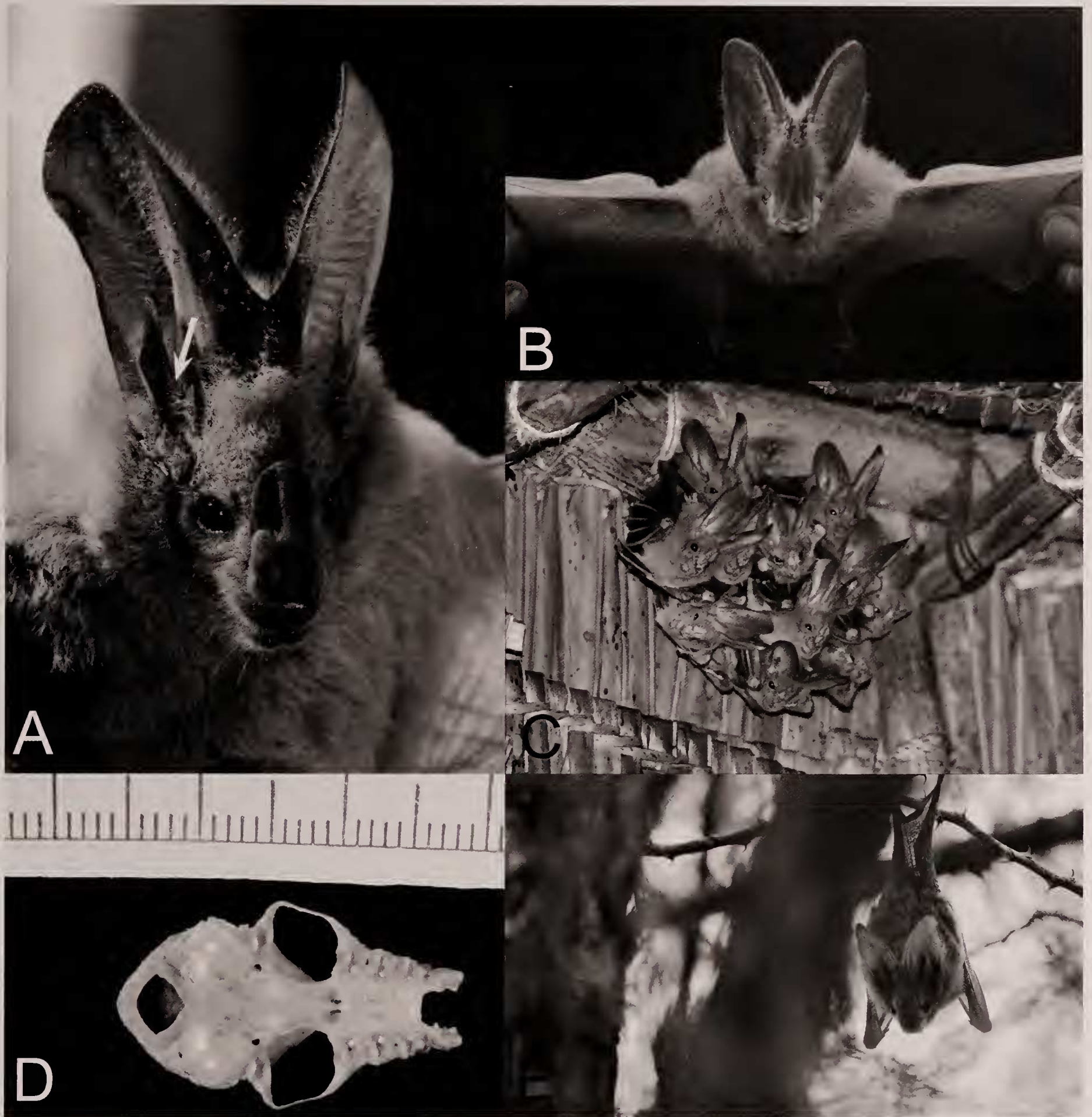


FIG. 7. Megadermatidae, external views, skull, and roosts: (A) head of *Cardioderma cor*, showing short, rounded noseleaf and long, forked tragus (arrow); (B) front view of *Lavia frons*, showing yellow wing membranes and long, blunt noseleaf; (C) a colony of *Cardioderma* roosting under a thatched roof (*makuti*); (D) ventral view of skull of *Lavia frons* (FMNH 154075), showing the family's diagnostic lack of upper incisors; (E) a lone *Lavia* roosting in a 2- to 3-m-tall *Acacia*. Photos by B. D. Patterson.

STATUS: Least Concern, population trend unknown.

STATUS: Least Concern, population trend stable.

***Lavia frons* (É. Geoffroy, 1810)**
Yellow-winged Bat

ORIGINAL DESCRIPTION: Geoffroy Saint-Hilaire (1810b: 192).

TYPE LOCALITY: Senegal.

DISTRIBUTION: Widespread in savannas from Senegal and Gambia to Sudan and Eritrea in the north, south to S Tanzania, N Zambia, and S Congo.

Rhinopomatidae

Mouse-tailed bats are represented by a single extant genus with a range from Morocco to the Sunda Shelf. They possess a long, thin tail extending far beyond the short uropatagium, large ears, a well-developed tragus, and a

TABLE 10. Measurements for the two African species of Megadermatidae. Abbreviations and definitions for measurements listed on pages 3–4.

	<i>Cardioderma cor</i>	<i>Lavia frons</i>
M	18–35	28–36
FA	49–59	53.1–64.3
HBL	62–78	60–80
TaL	0	0
HF	15–19	15–20
TiL	29–31.5	29–37
EL	35–40	33–47
TrL	9.5–12	22.5–27
GLS	25–26.3	21.3–26.1
ZB	15.3–15.5	13.5–15.5
Source	Csada, 1996; Thorn et al., 2009; Stanley, 2011	Vonhof and Kalcounis, 1999

small rounded noseleaf (Fig. 8). Three of the five recognized species occur in Africa, a fourth was recently described from Yemen, and the fifth occurs from the Arabian Peninsula to western India (Simmons, 2005; Benda et al., 2009). However, their relationships are in a state of flux, and in April 2012, the IUCN recognized only two species. They live in arid, treeless areas, roosting in caves, wells, and human structures (Nowak, 1999). A single species, *Rhinopoma macinnesi*, has been documented in East Africa, albeit under various names. The key, adapted from Van Cakenberghe and de Vree (1994) and Hayman (1937), affords a means of distinguishing this species from *R. hardwickii*, which occurs in North Africa and could conceivably extend into East Africa. Surveys in northern Kenya should determine whether *R. hardwickii* is sympatric with *R. macinnesi* in the area, as suggested by maps in IUCN (2011), or the two taxa could be widely allopatric (Hulva et al., 2007).

- 1 Larger (FA 52–59 mm; GLS 15.5–19.4 mm); heavier teeth (breadth of second upper molar > 2 mm) *Rhinopoma hardwickii*
- 1' Smaller (FA 45–52.5 mm; GLS 14.2–16.2 mm); more delicate teeth (breadth of second upper molar < 1.9 mm) *Rhinopoma macinnesi*

TABLE 11. Measurements for the two species of Rhinopomatidae known from East Africa and neighboring countries. Abbreviations and definitions for measurements listed on pages 3–4.

	<i>Rhinopoma hardwickii</i>	<i>Rhinopoma macinnesi</i>
M	5–10	5.0–11.0
FA	52–59	45.0–52.5
HBL	52–63	
TaL	44.5–87	54.9–75.8
EL	10–23.7	11.4–19.9
TiL	19.1–31	20.3–23.9
GLS	15.5–19.4	14.2–16.2
ZB	8.8–11.7	8.1–9.4
Source	Van Cakenberghe and de Vree, 1994; Thorn et al., 2009	Van Cakenberghe and de Vree, 1994

***Rhinopoma macinnesi* Hayman, 1937**
MacInnes' Mouse-tailed Bat

ORIGINAL DESCRIPTION: Hayman (1937: 530).

TYPE LOCALITY: Kenya, Lake Turkana, Bat Island, near Central Island.

TAXONOMY: East African mouse-tailed bats were originally described as a subspecies of *Rhinopoma cystops*, which is relegated to the synonymy of *R. hardwickii* (Simmons, 2005; IUCN, 2011); *R. hardwickii* is distributed in North Africa, Middle East, and the Indian Subcontinent. More recently, *R. macinnesi* was recognized as a species distinct from *R.*



FIG. 8. Rhinopomatidae, external view: museum specimen of *Rhinopoma macinnesi* (FMNH 152419), showing its long, whip-like tail; scale in centimeters. Photo by B. D. Patterson.

hardwickii (Van Cakenberghe & de Vree, 1994), which is now widely accepted. East African records for both *R. macinnesi* and *R. hardwickii* are apparently based on the same Kenyan records, the latter solely via synonymy.

DISTRIBUTION: Occurs in Kenya, Somalia, and Ethiopia; may occur in Eritrea and Uganda (Thorn et al., 2009).

STATUS: Data Deficient, population trend unknown.

Emballonuridae

The sheath-tailed bats, sometimes called the sac-winged bats, comprise 13 genera and more than 50 species with a pantropical distribution. Africa and Indian Ocean islands support eight species in three genera, all but one of which occur in East Africa. Their common names derive from characters diagnostic to the family. Many members of the family possess a tail that

protrudes midway across the uropatagium; others have a glandular sac in the wing membrane, either between the humerus and forearm or between the forearm and the metacarpal of the fifth digit (*Taphozous*). All emballonurids (Fig. 9) are insectivorous. The key is based on Stanley (2011), Colket and Wilson (1998), and Rosevear (1965).

- 1 FA generally > 80 mm; large with black pelage; gular sac in both sexes. *Saccolaimus peli*
- 1' FA generally < 80 mm, smaller and paler; gular sac variably present 2
- 2 Small (FA < 56 mm; GLS < 19 mm); tragus tall and narrow, parallel-sided; no radio-metacarpal wing sac; three lower incisors. *Coleura afra*
- 2' Large (FA > 56 mm; GLS > 20 mm); tragus laterally expanded; wing sac present; two lower incisors. *Taphozous*, 3

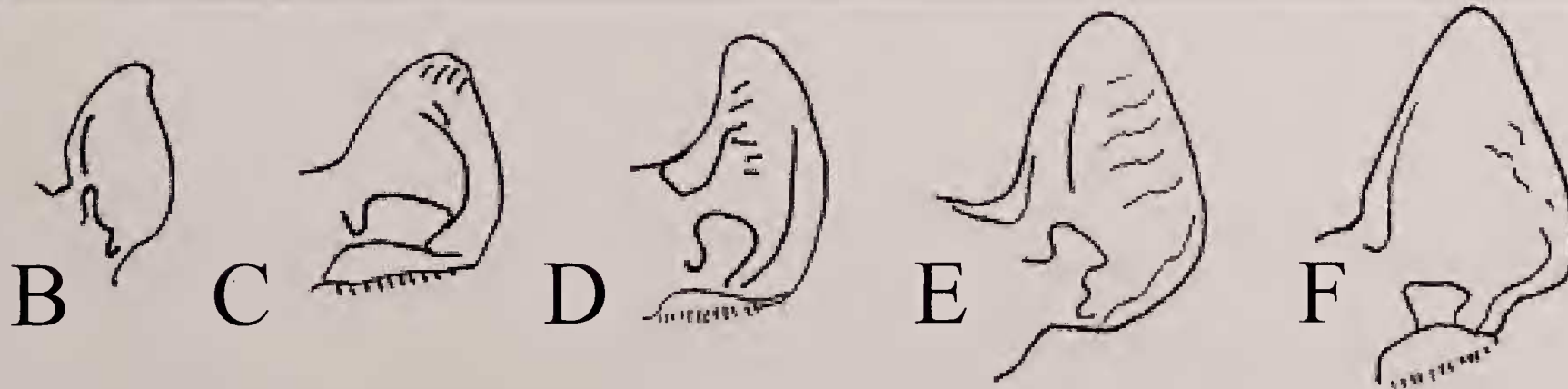


FIG. 9. Emballonuridae, external and schematic views: (A) *Coleura afra*, body profile; ear pinna and tragus of (B) *Coleura afra*; (C) *Taphozous mauritiauus*; (D) *Taphozous perforatus*; (E) *Taphozous nudiventris*; and (F) *Saccolaimus peli*. B-F redrawn from Rosevear (1965). Photo by B. D. Patterson.

- 3 Frontal region of skull only weakly concave; rump and pygal areas at least partly naked; occipital "helmet" on skull more or less developed Subgenus *Liponycterus*, 4
- 3' Frontal areas of skull strongly concave; rump and pygal areas well haired; no occipital helmet on skull Subgenus *Taphozous*, 5
- 4 Smaller (FA 61–69 mm); slight but definite concavity in frontal region; hairless rump and pygal areas relatively small; occipital helmet poorly developed . . . *Taphozous hamiltoni*
- 4' Larger (FA 69–81 mm); frontal concavity virtually absent; hairless rump and pygal areas relatively large; occipital helmet well developed *Taphozous nudiventris*
- 5 Gular sac present in males (sometimes also in females); whitish venter strongly contrasting with grizzled dorsal coloration *Taphozous mauritanus*
- 5' Gular sac absent; venter paler than uniform dorsal coloration 6
- 6 Blackish or reddish beard-like throat patch variably developed in males; whitish or buffy venter; somewhat larger size (FA 60–70 mm) and longer ears (EL 18–21 mm) *Taphozous hildegardae*
- 6' No differentiated throat patch present; tan or brownish venter; slightly smaller (FA 57–67 mm) with shorter ears (EL 17–20 mm) *Taphozous perforatus*

TABLE 12. Measurements for genera of Emballonuridae represented by a single species in East Africa. Abbreviations and definitions for measurements listed on pages 3–4.

	<i>Coleura afra</i>	<i>Saccolaimus peli</i>
M	6.5–12	92–105
FA	45–55	78–95
HBL	52–66	108–135
TaL	10–11	27–36
TiL	17–19	
HF	9–11	9–23
EL	12–17	22–31
GLS	17.2–18	30–33.5
ZB	9.6–10.3	19.5–21.9
Source	Thorn et al., 2009; Rosevear, 1965; Stanley, 2011	Thorn et al., 2009; Rosevear, 1965; Kingdon, 1974; Stanley, 2011

***Coleura afra* (Peters, 1852)**
African Sheath-tailed Bat

ORIGINAL DESCRIPTION: Peters (1852: 51).
TYPE LOCALITY: Mozambique, Tete.

DISTRIBUTION: A highly fragmented range of scattered populations from Guinea-Bissau to the Red Sea, with a coastal range from Sudan through N Tanzania and interior range extending south to Dem. Rep. Congo; isolated ranges in Angola, Mozambique, and Madagascar.

STATUS: Least Concern, population trend unknown.

***Saccolaimus peli* (Temminck, 1853)**
Pel's Pouched Bat

ORIGINAL DESCRIPTION: Temminck (1853: 82).
TYPE LOCALITY: Ghana, Boutry River.

DISTRIBUTION: Narrow distribution from Liberia to Ghana, Nigerian coast, Cameroon and Equatorial Guinea to E

Uganda and central Dem. Rep. Congo; isolated populations in W Kenya and E Angola.

STATUS: Least Concern, population trend unknown.

***Taphozous hamiltoni* Thomas, 1920**
Hamilton's Tomb Bat

ORIGINAL DESCRIPTION: Thomas (1920: 142).

TYPE LOCALITY: South Sudan, Equatoria, Mongalla.

DISTRIBUTION: Southernmost South Sudan, N Uganda, and the Turkana Basin of N Kenya.

STATUS: Data Deficient, population trend unknown.

***Taphozous hildegardae* Thomas, 1909**
Hildegarde's Tomb Bat

ORIGINAL DESCRIPTION: Thomas (1909b: 98).

TYPE LOCALITY: Kenya, Coast Province, Rabai (near Mombasa), 700 ft.

DISTRIBUTION: Coast of SE Kenya and NE Tanzania, including Zanzibar and Pemba.

STATUS: Vulnerable Blab(iii), population trend decreasing.

***Taphozous mauritanus* É. Geoffroy, 1818**
Mauritian Tomb Bat

ORIGINAL DESCRIPTION: Geoffroy Saint-Hilaire (1818: 127).

TYPE LOCALITY: Mauritius.

DISTRIBUTION: Widespread in West Africa from Ghana south through Angola and east to W Ethiopia south to Lesotho and KwaZulu-Natal (South Africa); isolated populations in Senegal and Sierra Leone, as well as on Mauritius, Réunion, Madagascar, Aldabra, and the Comoros.

STATUS: Least Concern, population trend unknown.

***Taphozous nudiventris* Cretzschmar, 1830**
Naked-rumped Tomb Bat

ORIGINAL DESCRIPTION: Cretzschmar (1830–1831: 70).

TYPE LOCALITY: Egypt, Pyramids at Giza.

DISTRIBUTION: Widely scattered isolated populations in Sahel from Mauritania and Senegal to S South Sudan and W Kenya, as well as Egypt, Israel, Iraq, Pakistan, India, and Burma.

STATUS: Least Concern, population trend stable.

***Taphozous perforatus* É. Geoffroy, 1818**
Egyptian Tomb Bat

ORIGINAL DESCRIPTION: Geoffroy Saint-Hilaire (1818: 126).

TYPE LOCALITY: Egypt, Kom Ombo.

DISTRIBUTION: Widely scattered isolated populations in Mauritania, Ghana, Niger, S Dem. Rep. Congo, Zimbabwe, central Tanzania, S Kenya, and the Nile from Uganda to Egypt, Jordan, across the Arabian Peninsula, and into the Indian Subcontinent.

STATUS: Least Concern, population trend stable.

Nycteridae

The slit-faced bats are a monogeneric family, with 16 species found in Africa and southern Asia. All but two of the

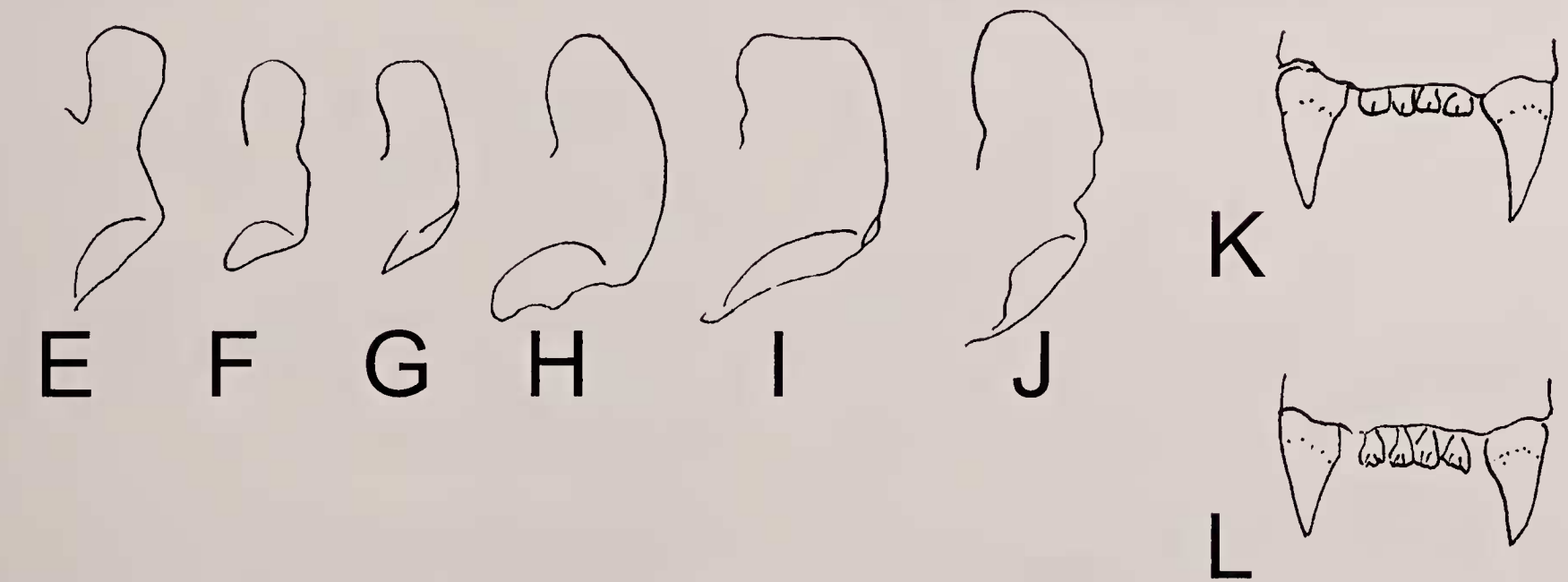
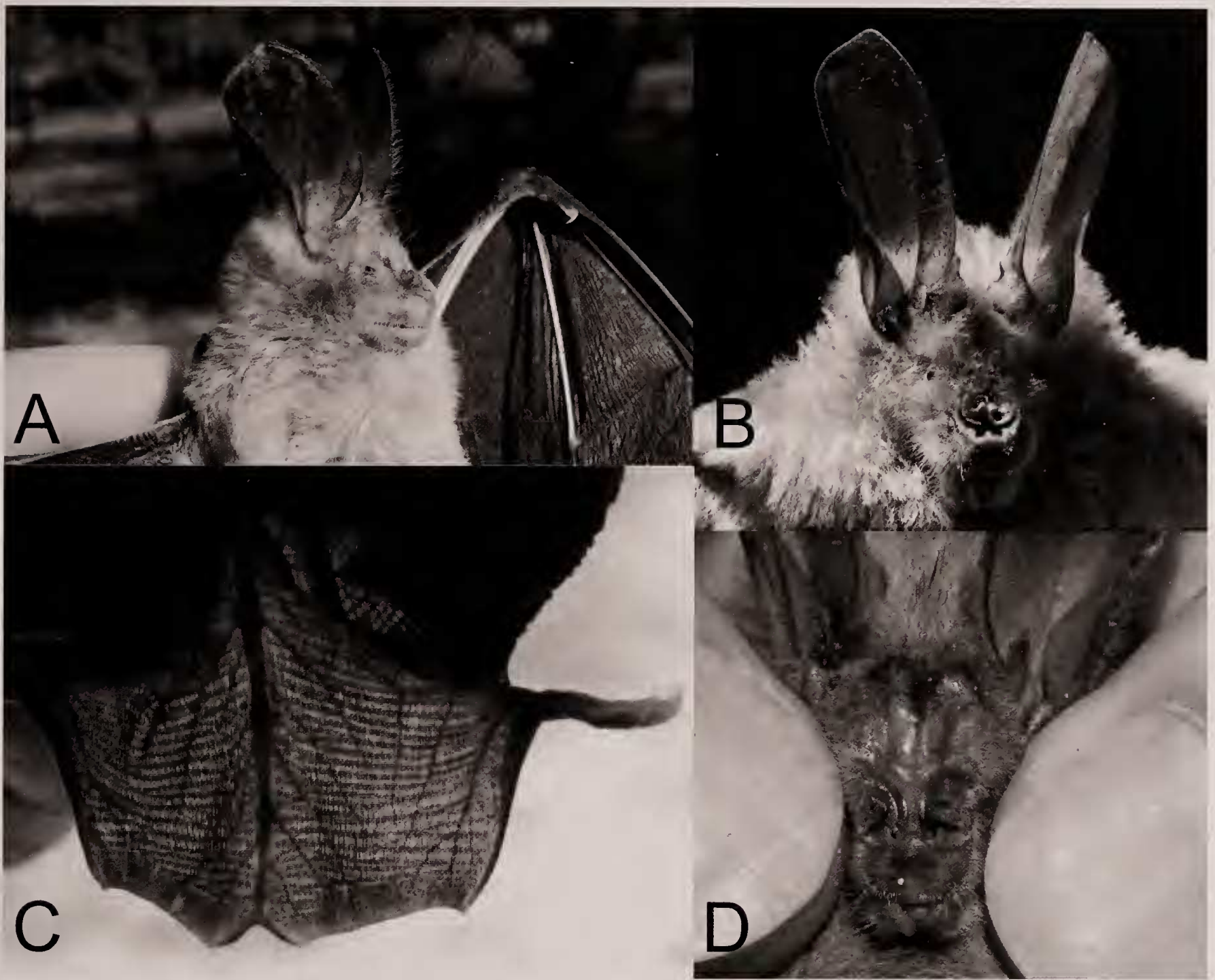


FIG. 10. Nycteridae, external and schematic views: (A) profile and (B) front view of head of a *Nycteris* species; (C) the diagnostic Y- or T-shaped cartilage at the tip of the tail; (D) the noseleaves being forcibly spread to reveal the depth of the nasal capsule. Tragus morphology of: (E) *N. arge* (showing marked concavity on the posterior border of the tragus); (F) *N. nana*; (G) *N. hispida* (showing posterior margin without marked constriction); (H) *N. grandis*; (I) *N. macrotis*; (J) *N. thebaica*; (K) bifid maxillary incisors; and (L) trifid maxillary incisors. E-J redrawn from Rosevear (1965); K-L redrawn from Happold and Happold (1989). Photos by B. D. Patterson.

TABLE 13. Measurements and identification features of species of *Taphozous* recorded from East Africa. Abbreviations and definitions for measurements listed on pages 3–4.

	<i>Taphozous hamiltoni</i>	<i>Taphozous hildegardeae</i>	<i>Taphozous mauritanus</i>	<i>Taphozous nudiventris</i>	<i>Taphozous perforatus</i>
M		20–27	16–34	60	22–33.2
FA	61–69	65–70	58–66	69–81	60–67
ToL	121–132	108–114	82–143	122–130	95–108
HBL	80	76–87	75–93	83–93	74–85
TaL	35	23–33	13–34	27–34	22–30
HF	16–17	13–15	12–15	17	10–12
EL	22–24	20	12–23	20–23	15–20
GLS	23.5–24.5	21.7	19.5–22.5	25.2–28.3	19–21.7
ZB	15	12.5–12.8	12.3–13.4	12.2–16.2	11.8–13
Gular sac	naked gular patch in females; condition of males unknown	absent in both males and females	gular sac present in males; rudimentary in females	present in both sexes	faintly indicated
Throat beard	none	black throat beard in males	none	none	none
Ventral coloration	pale sepia brown	buffy or whitish mainly on belly	entirely whitish, wings translucent	pale sepia brown; naked groin, rump	pale sepia brown
Source	Thomas, 1920; Colket and Wilson, 1998; FMNH	Stanley, 2011; Thomas, 1909b; Colket and Wilson, 1998; FMNH	Monadjem et al., 2010b; Thorn et al., 2009; Rosevear, 1965	Thorn et al., 2009; Rosevear, 1965; Stanley, 2011; FMNH	Monadjem et al., 2010b; Thorn et al., 2009; Rosevear, 1965; Stanley, 2011; FMNH

species occur in Africa and Madagascar, and nine of these occur in East Africa. They are readily distinguished by the longitudinal furrow in the muzzle, which expands into a deep pit in the forehead (Figs. 10B, D), and by the apical caudal cartilage, which creates a T- or Y-shaped midline on the uropatagium (Fig. 10C). They feed on a variety of arthropods, many taken from the ground, including scorpions and sun spiders. The key to nycterid species has been modified from Gray et al. (1999) and Rosevear (1965). Its reliance on measurements and their sometimes overlapping ranges limits its utility to discriminate some species (particularly *Nycteris arge* and *N. intermedia*).

- 1 Posterior lower premolar very small, tip reaching only to the cingulum of anterior premolar; upper incisors either bifid or trifid 2
- 1' Posterior lower premolar large, height about equal to anterior cusp of first molar; upper incisors bifid (Fig. 10K) *arge* group, 7
- 2 Upper incisors trifid (Fig. 10L); tragus small, outer margin smooth, broadest at its mid-length (Fig. 10G) *hispida* group, 3
- 2' Upper incisors bifid (Fig. 10K); tragus large, pear- or moon-shaped, with a prominent kink in the outer margin (Fig. 10E) 5
- 3 Size very large (FA 57–65 mm; GLS 24–27 mm); East African coastal forests *Nycteris grandis* (Fig. 10H)
- 3' Size moderate (FA 36–45 mm; GLS 15.3–18.4 mm); varied habitats including savannas 4
- 4 Size slightly larger (FA 37.3–44.5 mm; CBL 14.6–15.9 mm; maxillary tooththrow 5.7–6.2 mm; mandibular tooththrow 6.4–7.5 mm) *Nycteris aurita*
- 4' Size slightly smaller (FA 36–45 mm; CBL 13.2–15.0 mm; maxillary tooththrow 4.8–5.8 mm; mandibular tooththrow 5.4–6.6 mm) *Nycteris hispida* (Fig. 10G)
- 5 Tragus with squared or flattened tip; GLS > 18 mm. *macrodis* group, 6
- 5' Tragus inverted pear-shaped or pyriform (Fig. 10J); GLS ≤ 20 mm *Nycteris thebaica*

- 6 Smaller (FA 36.1–41.9 mm; CBL 14.0–16.1 mm); fur of underparts pure white, with no trace of dark bases on the hairs; very rare *Nycteris woodi*
- 6' Larger (FA 45–53 mm; CBL 16.4–19.6 mm); fur of underparts darker; common *Nycteris macrodis* (Fig. 10I)
- 7 Size small (FA 31–37 mm; CBL 12.8–14 mm; ZB 8.4–9.4 mm; width of braincase 6.5–7.4 mm; ML 9.2–10.7 mm; Fig. 10-F) *Nycteris nana*
- 7' Size larger (FA 33.7–48.5 mm; CBL 14.6–18.8 mm; ZB 10.0–12.6 mm; width of braincase 7.3–9.0 mm; ML 10.1–15.9 mm) 8
- 8 Slightly smaller (FA 33.7–38 mm; GLS 15.4–18.3 mm; CBL 14.6–15.7 mm; ZB 10.3–10.7 mm; ML 10.1–12.6 mm) *Nycteris intermedia*
- 8' Slightly larger (FA 39–46 mm; GLS 18–20.3 mm; CBL 15.4–18 mm; ZB 10.8–12.6 mm; ML 12.1–14.2 mm); commonest of group (Fig. 10E) *Nycteris arge*

***Nycteris arge* Thomas, 1903**
Bates' Slit-faced Bat

ORIGINAL DESCRIPTION: Thomas (1903a: 633).
 TYPE LOCALITY: Cameroon, Efulen.

DISTRIBUTION: Continuous range in coastal forests from Sierra Leone across West Africa south to N Angola and east to Uganda, W Kenya, and NW Tanzania; also Bioko.
 STATUS: Least Concern, population trend stable.

***Nycteris aurita* (K. Andersen, 1912)**
Andersen's Slit-faced Bat

ORIGINAL DESCRIPTION: Andersen (1912a: 547).
 TYPE LOCALITY: Kenya, Coast, Kilifi.

DISTRIBUTION: From S Ethiopia and Somalia to S South Sudan, E Uganda, all of Kenya, and central Tanzania.
 STATUS: Least Concern, population trend unknown.

***Nycteris grandis* Peters, 1865**
Large Slit-faced Bat

ORIGINAL DESCRIPTION: Peters (1865: 358).

TABLE 14. Measurements of species of *Nycteris* recorded from East Africa. Abbreviations and definitions for measurements listed on pages 3–4.

	<i>Nycteris arge</i>	<i>Nycteris aurita</i>	<i>Nycteris grandis</i>	<i>Nycteris hispidia</i>	<i>Nycteris intermedia</i>	<i>Nycteris macrotis</i>	<i>Nycteris nana</i>	<i>Nycteris thebaica</i>	<i>Nycteris woodi</i>
M	10–11	6–10	25–36	6–10	8–10	9–18.4	4–5	6–16	5–14
FA	39–46	37.3–44.5	57–65	36–45	33.7–38	45–53	31.7–37	41.6–53	38–50
ToL	92–128	94–101	155–156	81–97	48–58	111–124	74–92	83–121	86–108
HBL	48–67	32–50	63–93	32–54	51–55	52–70	39–40	47–60	52–63
TaL	42–61	46–52	64–78	34–52	23.4–33	40–74	34–46	47–59	42–55
Hf	10–11	9–10	15–16	15–16	21	15–16	9–10	10–12	9–9.5
EL	25–33	17–25	26–35	18–25	15.4–18.3	26–34	20–24	27–36	26–34
TiL	18.2–26.5	17.9–22.	29.5–33.7	18–21	10.3–10.7	23–27.5	12.8–16.4	23–26	15.6–16.4
CIL			23.4–24.0	14.5–15.2	bifid	18.8–19.2	17	16.2–19.2	
GLS	18.0–20.9	18.7	24–27	16.4–18.5	bifid	20–22	15.1–16.7	18.3–20	
ZB	10.8–12.6	9.7–10.7	15.6–17	9.7–11	bifid	11.5–13	9.2–9.4	10.5–11.5	9.5–10.0
Upper incisor form	bifid	trifid	trifid	trifid	bifid	bifid	bifid	bifid	bifid
Tragus shape	notched	smooth	smooth	smooth	notched	semi-lunate	notched	pyriform	semi-lunate
Source	Monadjem et al., 2010b; Thorn et al., 2009; Rosevear, 1965; Thomas et al., 1994	Stanley, 2011; Andersen, 1912a; Ansell, 1986; Van Cakenberghe and de Vree, 1993	Monadjem et al., 2010b; Thorn et al., 2009; Rosevear, 1965; Stanley, 2011; Thomas et al., 1994	Monadjem et al., 2010b; Rosevear, 1965; Thomas et al., 1994; Stanley, 2011; Thomas et al., 1994; FMNH	Monadjem et al., 2010b; Rosevear, 1965; Thomas et al., 1994; Stanley, 2011; Thomas et al., 1994	Monadjem et al., 2010b; Thorn et al., 2009; Rosevear, 1965; Stanley, 2011; Thomas et al., 1994	Monadjem et al., 2010b; Thorn et al., 2009; Rosevear, 1965; Thomas et al., 1994	Monadjem et al., 2010b; Thorn et al., 2009; Rosevear, 1965; Thomas et al., 1994; Van Cakenberghe and de Vree, 1998	Monadjem et al., 2010b; Stanley, 2011; Thomas et al., 1994

TYPE LOCALITY: Guinea.

DISTRIBUTION: A disjunct range involving a Central and West African segment from Senegal to E Dem. Rep. Congo and south to Gabon and Congo, and an East African segment in SE Kenya, E Tanzania, N Mozambique, Malawi, and adjacent Zambia and Zimbabwe; also occurs on Zanzibar and Pemba.

STATUS: Least Concern, population trend decreasing.

Nycteris hispidia (Schreber, 1775)

Hairy Slit-faced Bat

ORIGINAL DESCRIPTION: Schreber (1775: 169, 188).

TYPE LOCALITY: Senegal.

DISTRIBUTION: Widespread from Senegal and S Mauritania across Sahel to S Sudan and Ethiopia, following the Rift Valley south to Malawi, and N Zimbabwe and Botswana west to Angola; in East Africa, ranges to coast from S Somalia to central Tanzania; also occurs on Zanzibar and Bioko.

STATUS: Least Concern, population trend stable.

Nycteris intermedia Aellen, 1959

Intermediate Slit-faced Bat

ORIGINAL DESCRIPTION: Aellen (1959: 218).

TYPE LOCALITY: Côte d'Ivoire, Adiopodoume, near Abidjan.

DISTRIBUTION: Disjunct ranges in West Africa (coastal Liberia, Côte d'Ivoire, and Ghana) and Central Africa (Cameroon and Gabon south to Angola and east to Rwanda and Burundi).

STATUS: Least Concern, population trend decreasing.

Nycteris macrotis Dobson, 1876

Large-eared Slit-faced Bat

ORIGINAL DESCRIPTION: Dobson (1876b: 80).

TYPE LOCALITY: Sierra Leone.

DISTRIBUTION: Widespread from Senegal to S Sudan and Ethiopia, south to N Angola, Zambia, N Botswana, and N Zimbabwe, and north to coastal Somalia; includes Zanzibar.

STATUS: Least Concern, population trend unknown.

Nycteris nana (K. Andersen, 1912)

Dwarf Slit-faced Bat

ORIGINAL DESCRIPTION: Andersen (1912a: 547).

TYPE LOCALITY: Equatorial Guinea, Rio Muni, Benito River.

DISTRIBUTION: Three disjunct ranges: in Côte d'Ivoire and Ghana; the main range in Cameroon south to N Angola and much of Dem. Rep. Congo to the Albertine Rift and W Uganda; and W Kenya, with an isolated population in NE Uganda.

STATUS: Least Concern, population trend unknown.

Nycteris thebaica É. Geoffroy, 1818

Egyptian Slit-faced Bat

ORIGINAL DESCRIPTION: Geoffroy Saint-Hilaire (1818: 119).

TYPE LOCALITY: Egypt, Thebes (near Luxor).

DISTRIBUTION: Widespread in drier habitats from the Arabian Peninsula and Levant, down the Nile Valley, isolated populations in S Libya and W Morocco, and a widespread Sahelian range from Senegal to Eritrea and Somalia south to

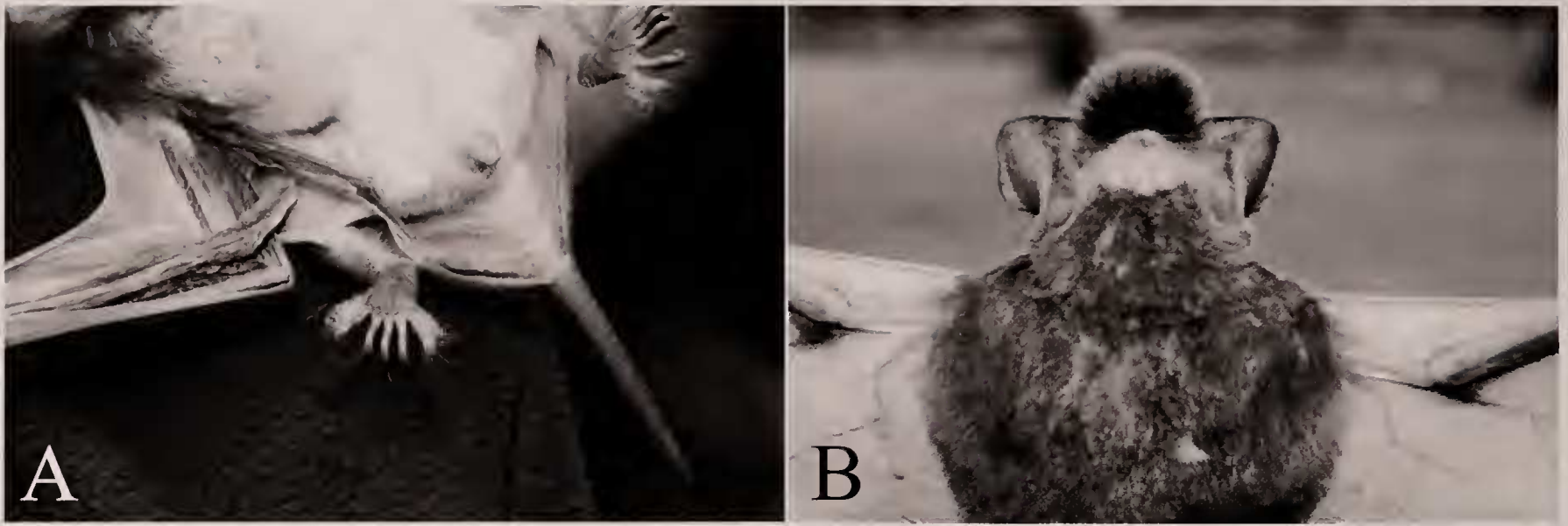


FIG. 11. Molossidae, external and schematic views: (A) ventral view of *Mops condylurus*, showing tail protruding from short uropatagium and spatulate hairs on edges of the feet; (B) posterior view of *Mops* head showing interaural tuft; (C–E) occlusal ridges on last right upper molar shown by bold line: (C) posterior ridge equal in length to the second; (D) posterior ridge half as long as the second; (E) posterior ridge merely a stub; (F, G) ventral view of palate, showing (F) well-developed anterior palatal emargination or notch extending back to the level of the canines; (G) weakly developed anterior palatal emargination, terminating at the level of the incisors. C–G redrawn from Rosevear (1965); photos by B. D. Patterson.

the Cape, excluding only the wet forests of West and Central Africa and the Kalahari and Namib deserts; also on Zanzibar and Pemba (Tanzania).

STATUS: Least Concern, population trend unknown.

Nycteris woodi K. Andersen, 1914
Wood's Slit-faced Bat

ORIGINAL DESCRIPTION: Andersen (1914: 563).

TYPE LOCALITY: Zambia, Chilanga.

DISTRIBUTION: Malawi, SW Tanzania, Zambia, Mozambique, and Zimbabwe, to Limpopo, South Africa.

STATUS: Least Concern, population trend decreasing.

Molossidae

The free-tailed and mastiff bats (Fig. 11) are found in tropical and warmer temperate parts of the world, occurring on all continents except Antarctica. The 100 species currently recognized are allocated to 13 genera (IUCN, 2011), three of which (*Sauromys*, *Myopterus*, and *Platymops*) are endemic to Africa, the latter two occurring in East Africa. In all, six genera and 26 species of free-tailed bats are known from East Africa. All eat flying insects (but see Aspetsberger et al., 2003), and many roost in crevices, although a host of roosting preferences are evident. The social systems of molossids are equally diverse: colonies of *Tadarida brasiliensis* (an American species) represent the largest aggregations of mammals on the planet, whereas *Myopterus whitleyi* is

apparently solitary (Nowak, 1999). The key to molossids has been modified from Stanley (2011) and Hayman and Hill (1971).

- 1 Large (FA > 57 mm); ears long (EL > 28mm), conjoined on elongated snout; bicolored dorsal pelage *Otomops martiensseni*
- 1' Large or small (FA < 66 mm); ears generally shorter (EL < 33 mm) and not joined on snout; unicolored dorsal pelage . . . 2
- 2 Skull conspicuously flattened, depth of braincase less than one-third its width; anterior upper premolar reduced or absent; well-developed gular sac; wart-like granulations on forearm; ears widely spaced; upper lip lined with short stiff bristles *Platymops setiger*
- 2' Lacking the above combination 3
- 3 Ears widely separated; one pair of lower incisors; four upper cheek-teeth, the last (M³) greatly reduced; ears and wing membranes translucent or whitish *Myopterus whitleyi*
- 3' Ears not widely separated, never translucent; generally two pairs of lower incisors; four or five upper cheek-teeth, the last about half the size of its neighbor; wing membranes varied. 4
- 4 Inner margins of the ears coming together at the base, without a band of skin between them; posterior ridge of W-pattern on last upper molar nearly as long as the second (Fig. 11C). *Tadarida*
- 4' Band of skin between the inner margins of the ears at their bases; posterior ridge of W-pattern on last upper molar shorter 5
- 5 First upper premolar minute and outside axis of toothrow, bringing canine and posterior premolar nearly into contact;

TABLE 15. Measurements for genera of Molossidæ represented by a single species in East Africa. Abbreviations and definitions for measurements listed on pages 3–4.

	<i>Myopterus whitleyi</i>	<i>Otomops martiensseni</i>	<i>Platymops setiger</i>
M	11.5	20–38.5	
FA	33–36	56.7–72	33.7–36.5
ToL		114–153	93–100
HBL	56–66	88–110	61
TaL	25–33	32–49	27–31
TiL	9–10.5	16–19.1	8.3
HF	6.8	15–16	7–8
EL	13	28–41	13–17
CIL	16.7	22.8–26.5	16.0–17.6
GLS	17.8–19	26.7–29.0	16.2–17.8
ZB	9.8–10.5	13.9–14.9	11.6–12.7
Source	Rosevear, 1965; Freeman, 1981; Smith et al., 2003	Monadjem et al., 2010b; Stanley, 2011; Long, 1995; FMNH	USNM; Freeman, 1981

posterior ridge of last tooth of upper jaw short (\leq half length of ridge next to it), little more than a stub (Fig. 11E); anterior palatal gap usually long, reaching back to level of canines (Fig. 11F) *Mops*
 5' First upper premolar small but in line with canine and posterior premolar, separating them; posterior ridge of last upper molar about half as long as the second ridge; anterior palatal gap very short (Fig. 11G) or lacking, replaced by two post-incisive foramina *Chaerephon*

***Myopterus whitleyi* (Scharff, 1900)**

Bini Winged-mouse Bat

ORIGINAL DESCRIPTION: Scharff (1900: 569).

TYPE LOCALITY: Nigeria, Mid-Western, Benin City.

DISTRIBUTION: Ghana, Nigeria, Cameroon, Dem. Rep. Congo, Uganda.

STATUS: Least Concern, population trend decreasing.

***Otomops martiensseni* (Matschie, 1897)**

Large-eared Giant Mastiff Bat, Large-eared Free-tailed Bat

ORIGINAL DESCRIPTION: Matschie (1897: 84).

TYPE LOCALITY: Tanzania, Tanga, Muheza, Magrotto Plantation.

DISTRIBUTION: Yemen; Djibouti and Central African Republic to Angola and Natal (South Africa); Ghana.

STATUS: Near Threatened, population trend decreasing.

***Platymops setiger* (Peters, 1878)**

Peters' Flat-headed Bat

ORIGINAL DESCRIPTION: Peters (1878: 196).

TYPE LOCALITY: Kenya, Eastern, Taita, Ndi.

DISTRIBUTION: S South Sudan, Ethiopia, and Kenya.

STATUS: Least Concern, population trend unknown.

Chaerephon

The lesser mastiff or free-tailed bats are sometimes placed in *Tadarida*, but species of *Chaerephon* have the ears joined by a band of skin, an elevated mandibular condyle, and broader wing tips. They differ from *Mops* in having more gracile jaws and a shorter, more constricted anterior palatal emargination that ends just behind the upper incisors (Nowak, 1999; Fig. 11G). The last upper molar has an N-shaped occlusal surface (Freeman, 1981; Fig. 11D). This Palearctic genus

has 14 species distributed from the African Cape through much of Sub-Saharan Africa, Madagascar and various Indian Ocean islands, the Middle East, and southern Asia as far east as Fiji and Australia. Nine species are recorded in East Africa, all feeding on flying insects. The key is modified from Bouchard (1998).

- 1 Ears conjoined by triangular lappet of skin. *Chaerephon major*
- 1' Ears completely separated 2
- 2 Size larger (FA 41–53 mm). 3
- 2' Size smaller (FA 32–43.3 mm) 8
- 3 Paired caudal glands opening as slits on either side of the tail root below; FA 41–48 mm *Chaerephon bemmelinei*
- 3' Without such glands; FA 32–53 mm 4
- 4 White spots, stripes, or lateral bands. 5
- 4' Without white markings. 6
- 5 Color umber brown with variable pattern of white spots or short stripes arranged laterally on crown and sometimes also on shoulders or flanks; FA 46–52 mm. *Chaerephon bivittatus*
- 5' Conspicuous white ventrolateral band along flanks at juncture with membrane, contrasting with very dark brown color above and below; FA 45–51 mm *Chaerephon nigeriae*
- 6 Color umber brown; top of head, neck, and throat of males darker, almost black; FA 43–48 mm *Chaerephon ansorgei*
- 6' Color uniformly russet brown; FA 42–53 mm 7
- 7 Smaller (FA 42–46 mm). *Chaerephon russatus*
- 7' Larger (FA 51–53 mm) *Chaerephon aloysiisabaudiae*
- 8 FA 35–42 mm; males with long (13–14 mm) bicolored interaural crest (dark basally, pale distally); wings pale; venter pale with whitish band on mid-line of belly. *Chaerephon chapini*
- 8' FA 32–43 mm; males with short (\leq 10 mm) unicolored (dark) interaural crest; wings dark or pale; color below variable, with or without white on mid-venter *Chaerephon pumilus*

***Chaerephon aloysiisabaudiae* (Festa, 1907)**

Duke of Abruzzi's Free-tailed Bat

ORIGINAL DESCRIPTION: Festa (1907: 1).

TYPE LOCALITY: Uganda, Toro.

TABLE 16. Measurements and identification features of species of *Chaerephon* recorded from East Africa. Abbreviations and definitions for measurements listed on pages 3-4.

	<i>Chaerephon aloysiabaudiae</i>	<i>Chaerephon ansorgei</i>	<i>Chaerephon benneloni</i>	<i>Chaerephon bivittatus</i>	<i>Chaerephon chapini</i>	<i>Chaerephon major</i>	<i>Chaerephon nigeriae</i>	<i>Chaerephon pumilus</i>	<i>Chaerephon russatus</i>
M	20-38	9-22	14	14-32	7-15	10-28	12-16	6-13.5	42-46
FA	51-53	43-48.3	41-48	46-52	34.7-42	39-50	45.6-50.9	32-43.3	102
ToL		102-123		106-129	90-103	85-113	103-122	72-107	
HBL		72-79	64-70	65-81		65-70	61-72	54-74	66.7-68
TaL		31-37	35-40	32-48	33-42	27-42	34-48	24-43	31.5-34
TiL		15-15.5	14			12.5-13.5	13.5-15	13-14.3	13.6
HF		11-12	11		7	8		9	9.4-10
EL		20-21	15-18	15-22	15-18	12-21	18-23	9-19	19-21
CIL		17.3-18.9		19.5-21.3	15.0-15.3	17-19.3	17.2-19.2	14.3-17	17.2
GLS		19.1-20.5	16.5-18.4	19.1-20.6	16.1	18-19	19.07-19.8	16-18	18.7-18.8
ZB		11.1-12.2	10.5-11.1	12.5-13	9.8	11.2-12.2	11.9-12.53	9.5-10	11-11.2
Interaural crest	no	no	no	no	yes, bicolored	no	yes, unicolored	yes, unicolored	no
Interaural fold	no	without lobe projecting between inner bases of ears	no	no	no	more or less detached flap of skin between bases of ears	broad connecting band of skin between inner margins of ears, rolled back on top edge	no	no
Source	Thorn et al., 2009	Bouchard, 2001; Monadjem et al., 2010b; Stanley, 2011; Thorn et al., 2009	Rosevear, 1965; Stanley, 2011; Thorn et al., 2009; Bouchard, 2001	Monadjem et al., 2010b; Stanley, 2011; Thorn et al., 2009	Monadjem et al., 2010b; Thorn et al., 2009	Monadjem et al., 2010b; Stanley, 2011; Thorn et al., 2009; Rosevear, 1965; Willis et al., 2002	Monadjem et al., 2010b; Stanley, 2011; Rosevear, 1965; Willis et al., 2002	Monadjem et al., 2010b; Stanley, 2011; Rosevear, 1965	Freeman, 1981; Allen et al., 1917

DISTRIBUTION: Côte d'Ivoire and Ghana, and a narrow band across N Dem. Rep. Congo from Cameroon and Gabon to SW South Sudan and W Uganda.

STATUS (AS *TADARIDA ALOYSIISABAUDIAE*): Least Concern, population trend decreasing.

***Chaerephon ansorgei* (Thomas, 1913)**
Ansorge's Free-tailed Bat

ORIGINAL DESCRIPTION: Thomas (1913a: 318).

TYPE LOCALITY: Angola, Malange, 1150 m.

DISTRIBUTION: Circum-Congo distribution from Côte d'Ivoire to Ethiopia and south through E Dem. Rep. Congo and W Kenya to E Angola and N Natal (South Africa).

STATUS (AS *TADARIDA ANSORGEI*): Least Concern, population trend stable.

***Chaerephon bemmeleni* (Jentink, 1879)**
Gland-tailed Free-tailed Bat

ORIGINAL DESCRIPTION: Jentink (1879: 125).

TYPE LOCALITY: Liberia.

DISTRIBUTION: Widely separated West African (Sierra Leone to Côte d'Ivoire) and East African ranges, the latter having populations in the Albertine Rift (Congo–Rwanda–Burundi–Uganda–S South Sudan) and across N Tanzania and S Kenya.

STATUS (AS *TADARIDA BEMMELENI*): Least Concern, population trend unknown.

***Chaerephon bivittatus* (Heuglin, 1861)**
Spotted Free-tailed Bat

ORIGINAL DESCRIPTION: Heuglin (1861: 4, 13).

TYPE LOCALITY: Eritrea, Keren.

DISTRIBUTION: East Africa from Eritrea south through Ethiopia, S and E South Sudan, E Uganda, W and S Kenya, E Tanzania, Malawi, E Zambia, and N Zimbabwe.

STATUS (AS *TADARIDA BIVITTATA*): Least Concern, population trend stable.

***Chaerephon chapini* J. A. Allen, 1917**
Pale Free-tailed Bat, Chapin's Free-tailed Bat

ORIGINAL DESCRIPTION: J. A. Allen in Allen et al. (1917: 461).

TYPE LOCALITY: Dem. Rep. Congo, Oriental, Faradje.

DISTRIBUTION: Range extends from a widely disjunct population in Ghana, to more coherent, widespread ranges in savanna woodlands from S Ethiopia and S South Sudan through Uganda, Rwanda, Burundi, and W Kenya, and in W Tanzania, S Dem. Rep. Congo, Angola, Zambia, and N Namibia and N Zimbabwe.

STATUS (AS *TADARIDA CHAPINI*): Least Concern, population trend unknown.

***Chaerephon major* (Trouessart, 1897)**
Lappet-eared Free-tailed Bat

ORIGINAL DESCRIPTION: Trouessart (1897: 146).

TYPE LOCALITY: "Upper Nile" (based on description of specimen from Sudan, 5th Cataract of the Nile by Dobson, 1878: 428).

DISTRIBUTION: Widely isolated range over much of West Africa (Guinea to Niger and Nigeria), with additional disjunct

ranges along the length of the Sudanese Nile into N Dem. Rep. Congo, in W Kenya, E Uganda, and N Tanzania fringing Lake Victoria, in coastal S Kenya and N Tanzania, and in Zambia.

STATUS (AS *TADARIDA MAJOR*): Least Concern, population trend stable.

***Chaerephon nigeriae* Thomas, 1913**
Nigerian Free-tailed Bat

ORIGINAL DESCRIPTION: Thomas (1913a: 319).

TYPE LOCALITY: Nigeria, Northern, Zaria Province.

DISTRIBUTION: Disjunct range segments in Central Africa (Ghana to S South Sudan and N Dem. Rep. Congo) and Southern Africa (S Dem. Rep. Congo, Zambia, Zimbabwe, Botswana, Namibia, and Angola), with isolated populations in Ethiopia and S Tanzania (see Kityo et al., 2009a).

STATUS (AS *TADARIDA NIGERIAE*): Least Concern, population trend unknown.

***Chaerephon pumilus* (Cretzschmar, 1830)**
Little Free-tailed Bat

ORIGINAL DESCRIPTION: Cretzschmar (1830–1831: 69).

TYPE LOCALITY: Eritrea, "Massawa."

DISTRIBUTION: Widely disjunct West African range from Senegal to Cameroon. In east, range from Yemen and Eritrea south to Angola and N Botswana, with a coastal distribution in SE Africa from Mozambique to E South Africa; also on Madagascar, Zanzibar, and Pemba.

STATUS (AS *TADARIDA PUMILA*): Least Concern, population trend unknown.

***Chaerephon russatus* J. A. Allen, 1917**
Russet Free-tailed Bat

ORIGINAL DESCRIPTION: Allen et al. (1917: 458).

TYPE LOCALITY: Dem. Rep. Congo, Oriental, Medje.

DISTRIBUTION: West Africa (Liberia to Ghana), Central Africa (Cameroon to N Dem. Rep. Congo), and an isolated population in Kenya.

STATUS (AS *TADARIDA RUSSATA*): Data Deficient, population trend unknown.

Mops

The greater mastiff bats are sometimes treated as species of *Tadarida*, but are distinguished by pronounced sagittal and lambdoidal crests, generally heavier mandibles with a higher coronoid process, anterior displacement of the palate's posterior margin, and reduced dentition, in which the final upper molar has a V-shaped occlusal pattern (Fig. 11E). There are 14 species, mainly in Sub-Saharan Africa, but some species range as far east as the Philippines and the Sunda Shelf. Ten of the 14 species occur in East Africa; all eat flying insects. The key is modified from Hayman and Hill (1971), Dunlop (1999), and Stanley (2008).

- | | | |
|----|---------------------------------------------|---------------------|
| 1 | Size small (FA < 31 mm) | <i>Mops nanulus</i> |
| 1' | Size larger (FA > 34 mm) | 2 |
| 2 | Size large (FA > 60 mm; GLS 26–28 mm) . . . | <i>Mops midas</i> |

- 2' Size smaller (FA 35–58 mm; GLS < 27.4 mm) 3
 3 FA > 51 mm 4
 3' FA < 51 mm 5
 4 Ears joined at base; FA 53–58 mm; deep chestnut coloration; wing membranes blackish brown above and a little paler below (bones appear dark) *Mops congicus*
 4' Ears separated at base; FA 52–54 mm; dull cinnamon brown above with much paler pelage below; patagia and wing bones black above and much paler below (bones whitish) *Mops trevori*
 5 Male with scent gland at base of penis *Mops demonstrator*
 5' Male without such gland 6
 6 FA 42–51 mm 7
 6' FA 34–41 mm 8
 7 Crown darker than back; venter mainly white; skull with low or no sagittal crest; third commissure of last upper molar obsolete; deep basisphenoid pits *Mops niveiventer*
 7' Crown not darker than back; little or no white on venter; skull with well-developed sagittal crest; third commissure of last upper molar present but reduced; shallow basisphenoid pits *Mops condylurus*
 8 Underside brownish, with blackish flanks; larger (FA 36–41 mm) *Mops thersites*
 8' Underside whitish or yellowish; smaller (FA 34–39 mm) 9
 9 Skull with well-developed basisphenoid pits; crown of first upper premolar far surpassing cingulum of second premolar and canine *Mops brachypterus*
 9' Basisphenoid pits lacking; first upper premolar scarcely surpassing cingulum of second premolar and canine *Mops bakarii*

***Mops bakarii* Stanley, 2008**
Bakari's Free-tailed Bat

ORIGINAL DESCRIPTION: Stanley (2008: 184).
 TYPE LOCALITY: Tanzania, Pemba Island, Ngezi Forest.
 DISTRIBUTION: Known only from the type locality.
 STATUS: Not Evaluated.

***Mops brachypterus* (Peters, 1852)**
Short-winged Free-tailed Bat, Sierra Leone Free-tailed Bat

ORIGINAL DESCRIPTION: Peters (1852: 59).
 TYPE LOCALITY: Mozambique, Mozambique Island, 15S°.
 DISTRIBUTION: An equatorial strip from Gambia and Sierra Leone to W Uganda, and a coastal strip from Kenya through E Tanzania (including Zanzibar and Mafia islands) to N Mozambique.

STATUS (AS *TADARIDA BRACHYPTERA*): Least Concern, population trend unknown.

***Mops condylurus* (A. Smith, 1833)**
Angolan Free-tailed Bat

ORIGINAL DESCRIPTION: Smith (1833: 54).
 TYPE LOCALITY: South Africa, Natal, Durban.
 DISTRIBUTION: Circum-Congo distribution from Senegal to South Sudan and Ethiopia, Uganda, Kenya, and Somalia south to Transvaal, South Africa; also in S Dem. Rep. Congo, Zambia, Angola, and N Botswana.

STATUS (AS *TADARIDA CONDYLURA*): Least Concern, population trend unknown.

TABLE 17. Measurements of species of *Mops* recorded from East Africa. Abbreviations and definitions for measurements listed on pages 3–4.

	<i>Mops bakarii</i>	<i>Mops brachypterus</i>	<i>Mops condylurus</i>	<i>Mops congicus</i>	<i>Mops demonstrator</i>	<i>Mops midas</i>	<i>Mops nanulus</i>	<i>Mops niveiventer</i>	<i>Mops thersites</i>	<i>Mops trevori</i>
M	13–18.5	13–18	13–31	43–62	17	40–61	8–14	42.7–47.1	22–29	
FA	34–38	36–39	42.2–51	53–58	41–44	60–66	27–31	111–114	36–41	53.6
ToL	87–105		95–132	140	64–72	115–165	75–88	72–84	94–119	121.5
HBL		63–67	66–78	86–101	30–37	98–121	54–61	34	63–76	82.3–89
TaL	24–33	26–33	31–51	42–51		39–65	19–26	13.7	25–37	38–39.2
TiL			15.9–20.1			19	10–11.5	9.5–11	13–15	17.7–20
HF	8–11	9–10	11–15	13–17	10	10.5	6.4–8.3	18–21	9–10	11.6–13.6
EL	15–17	14–20	10–21	20–25	17–18	21–32	11–18	20–21	15	20–21
CIL	15.8–18.2	15.8–18.2	16.5–19.9	25–27.4	19.7–22	23.8–26.1	14.4–15.1	21	18.3–21.5	21.8
GLS	17.5–20	17.5–20.0	19–22.9	14.5–16.2	12.2–13	27.4	15.5–17.7	13.4–13.8	17.5–21.3	23.3–24.2
ZB	10.9–12.6	10.9–12.6	12.2–13.5			17.4	9.8–11.3		11.6–12.8	14.5–14.6
Source	Stanley, 2008	Thorn et al., 2009; Stanley, 2008	Monadjem et al., 2010b; Stanley, 2011; Freeman, 1981; Allen et al., 1917	Thorn et al., 2009; Allen et al., 1917	Thorn et al., 2009	Monadjem et al., 2010b; Stanley, 2011; Freeman, 1981; Allen et al., 1917	Stanley, 2008; Rosevear, 1965; Monadjem et al., 2010b; Thorn et al., 2009; Lavrenchenko et al., 2004	Monadjem et al., 2010b; Stanley, 2011; Freeman, 1981; Cabrera and Ruxton, 1926; FMNH	Stanley, 2008; Thorn et al., 2009; Monadjem et al., 2010b; Rosevear, 1965	Freeman, 1981; Allen et al., 1917

Mops congicus J. A. Allen, 1917
Congo Free-tailed Bat, Medje Free-tailed Bat

ORIGINAL DESCRIPTION: J. A. Allen in Allen et al. (1917: 467).

TYPE LOCALITY: Dem. Rep. Congo, Oriental, Medje.

DISTRIBUTION: A narrow equatorial band from Cameroon through N Dem. Rep. Congo to W Uganda.

STATUS (AS *TADARIDA CONGICA*): Least Concern, population trend unknown.

Mops demonstrator (Thomas, 1903)
Mongallan Free-tailed Bat, Mongalla Free-tailed Bat

ORIGINAL DESCRIPTION: Thomas (1903b: 504).

TYPE LOCALITY: South Sudan, Equatoria, "Mangala" (= Mongalla).

DISTRIBUTION: A narrow equatorial belt from Côte d'Ivoire to W Uganda and north along the Nile into E Sudan.

STATUS (AS *TADARIDA DEMONSTRATOR*): Least Concern, population trend decreasing.

Mops midas (Sundevall, 1843)
Midas' Free-tailed Bat

ORIGINAL DESCRIPTION: Sundevall (1843: 207).

TYPE LOCALITY: Sudan, Blue Nile Province, White Nile, West bank, "Jebel el Funj."

DISTRIBUTION: Widely scattered lowlands from Senegal to Sudan and Saudi Arabia, south to Namibia, Botswana, and Transvaal (South Africa), but excluding the Congo Basin and Angola; also in Madagascar.

STATUS (AS *TADARIDA MIDAS*): Least Concern, population trend decreasing.

Mops nanulus J. A. Allen, 1917
Dwarf Free-tailed Bat

ORIGINAL DESCRIPTION: J. A. Allen in Allen et al. (1917: 477).

TYPE LOCALITY: Dem. Rep. Congo, Oriental, Niangara.

DISTRIBUTION: Coastal West Africa (Sierra Leone through Ghana) across Congo Basin from E Nigeria to S South Sudan, Uganda, and W Kenya, with a peripheral population in SW Ethiopia.

STATUS (AS *TADARIDA NANULA*): Least Concern, population trend unknown.

Mops uiveiventer Cabrera and Ruxton, 1926
White-bellied Free-tailed Bat

ORIGINAL DESCRIPTION: Cabrera and Ruxton (1926: 594).

TYPE LOCALITY: Dem. Rep. Congo, Kasai Occidental, St. Joseph de Luluabourg (= Kananga).

TAXONOMY: Although Kityo et al. (2009a) and IUCN (2011) listed this bat from Uganda, Rwanda, Burundi, and W Tanzania, these records are apparently attributable to other bat species (see Thorn et al., 2009).

DISTRIBUTION: In south-central Africa, from Angola, Dem. Rep. Congo, S Tanzania, to Zambia and N Mozambique (Monadjem et al., 2010b).

STATUS (AS *TADARIDA NIVEIVENTER*): Least Concern, population trend unknown.

Mops thersites (Thomas, 1903)
Railer Free-tailed Bat, Railer Bat

ORIGINAL DESCRIPTION: Thomas (1903a: 634).

TYPE LOCALITY: Cameroon, Efulen.

DISTRIBUTION: Disjunct in coastal West Africa (Sierra Leone through Ghana) and across Congo Basin (Nigeria to Rwanda and W Kenya).

STATUS (AS *TADARIDA THERSITES*): Least Concern, population trend stable.

Mops trevori J. A. Allen, 1917
Trevor's Free-tailed Bat

ORIGINAL DESCRIPTION: J. A. Allen in Allen et al. (1917: 469).

TYPE LOCALITY: Dem. Rep. Congo, Oriental, Faradje.

DISTRIBUTION: Widely disjunct in West Africa (from Guinea to Nigeria) and Central Africa (NE Dem. Rep. Congo, W Uganda, S South Sudan).

STATUS (AS *TADARIDA TREVORI*): Data Deficient, population trend decreasing.

Tadarida

The free-tailed bats are represented by eight species in Europe, Africa, Asia, Australia, and the Americas; four species are found in East Africa. They typically have wrinkled lips, a deeply incised anterior margin to the palate (Fig. 11F), and a W-shaped pattern on the last upper molar (Fig. 11C). The key was adapted from Hayman and Hill (1971).

- 1 FA < 53 mm; braincase flat; lower canines widely separated at base *Tadarida aegyptiaca*
- 1' FA > 55 mm; braincase deeper; lower canines more crowded 2
- 2 Ears very large, united along inner margins close to nostrils, projecting well beyond muzzle when laid forward; underside all white, except for flank stripe; skull (particularly rostrum) narrow *Tadarida lobata*
- 2' Ears smaller, not joined at inner margin, barely projecting past muzzle when laid forward; underside not all white; skull and rostrum not slender. 3
- 3 Skull very broad and heavy (ZB 15.6 mm), especially in rostrum; GLS > 23.4 mm; FA 61–65 mm; underside mostly brownish *Tadarida ventralis*
- 3' Skull much less broad in rostral region (ZB 13.8 mm); GLS < 23 mm; FA 56–62 mm; underside with variable white band along ventral midline. *Tadarida fulminans*

Tadarida aegyptiaca (É. Geoffroy, 1818)
Egyptian Free-tailed Bat

ORIGINAL DESCRIPTION: Geoffroy Saint-Hilaire (1818: 128).

TYPE LOCALITY: Egypt, Giza (restricted by Koopman, 1975).

DISTRIBUTION: Scattered localities in Sri Lanka, India, and Pakistan, Arabian Peninsula, Egypt, Algeria, S Kenya, coastal Angola and N Namibia, and SE Africa from Malawi to the Cape (South Africa).

STATUS: Least Concern, population trend unknown.

TABLE 18. Measurements of species of *Tadarida* recorded from East Africa. Abbreviations and definitions for measurements listed on pages 3–4.

	<i>Tadarida aegyptiaca</i>	<i>Tadarida fulminans</i>	<i>Tadarida lobata</i>	<i>Tadarida ventralis</i>
M	9–22	36–39	23–33	31–61
FA	42–51.8	56.4–62	55.7–59.1	60.8–65.2
ToL	90–136	125–163	124–136	142–168
HBL	74	91		86–96
TaL	30–50	53–65	51–56	51–66
TiL	13.3–17.2	16.7–22.3	18.2	
HF	8.8	10	9.8	
EL	13–22	19–25	25–30.5	18–29
CiL	16.2–20.4	21.5–23.4	23	
GLS	19.8	22.2	22.3–23.15	23.4–26.1
ZB	12.6	13.8	13.05–13.68	15.6
Source	Thorn et al., 2009; Monadjem et al., 2010b; Freeman, 1981	Monadjem et al., 2010b; Freeman, 1981; FMNH; USNM	Monadjem et al., 2010b; Freeman, 1981	Monadjem et al., 2010b; Stanley, 2011; Ansell, 1986

***Tadarida fulminans* (Thomas, 1903)**

Malagasy Free-tailed Bat, Madagascan Large Free-tailed Bat

ORIGINAL DESCRIPTION: Thomas (1903b: 501).

TYPE LOCALITY: Madagascar, Betsilo, Fianarantsoa.

DISTRIBUTION: E Dem. Rep. Congo, Rwanda, W Kenya, N Tanzania, Malawi, Mozambique, Zimbabwe, Zambia, Transvaal (South Africa); also Madagascar.

STATUS: Least Concern, population trend stable.

***Tadarida lobata* (Thomas, 1891)**

Big-eared Free-tailed Bat, Kenyan Big-eared Free-tailed Bat

ORIGINAL DESCRIPTION: Thomas (1891b: 303).

TYPE LOCALITY: Kenya, West Pokot, Turkwell Gorge.

DISTRIBUTION: Widely disjunct populations in W and S Kenya and in N Zimbabwe.

STATUS: Least Concern, population trend unknown.

***Tadarida ventralis* (Heuglin, 1861)**

Giant Free-tailed Bat, African Giant Free-tailed Bat

ORIGINAL DESCRIPTION: Heuglin (1861: 4, 11).

TYPE LOCALITY: Eritrea, Keren.

DISTRIBUTION: Interior East Africa from Eritrea to Zimbabwe, with peripheral populations in Malawi and South Africa.

STATUS: Data Deficient, population trend unknown.

Miniopteridae

Long treated as a subfamily of Vespertilionidae (e.g., Koopman, 1994; Simmons, 2005), *Miniopterus* apparently diverged from vespertilionids 38–47 million years ago, according to molecular-clock estimates; still, there remains good evidence for a sister-group relationship between them (Miller-Butterworth et al., 2007). The family contains only a single extant genus (Fig. 12). *Miniopterus* is readily recognized by the exceptional length of the terminal phalanx of the third digit; the tail is also proportionately longer than in other similar-sized insectivorous bats. Although 11 species of “bent-winged” or “long-fingered” bats were recognized as recently as a decade ago (Nowak, 1999), the most recent list includes 24 species (IUCN, 2011), many distinguished on the basis of

echolocation call frequencies, bacular morphology, and tragus size and shape. All inhabit tropical and temperate biomes of the Old World, from southern Europe and West Africa to Japan and Australia; five species occur in East Africa. Unfortunately, these newer diagnostic characters have not been documented for all East African species. The key is adapted from Hayman and Hill (1971) and Monadjem et al. (2010b), with information from Peterson et al. (1995).

- 1 Size small (FA < 42 mm; GLS < 14 mm; TiL < 16 mm). *Miniopterus minor*
- 1' Size larger (FA > 41 mm; GLS > 14.5 mm; TiL > 16 mm) 2
- 2 Size large (FA 45–52 mm; GLS > 16 mm) 3
- 2' Size smaller (FA 41–50 mm; GLS < 16 mm) 4
- 3 Metacarpal of D3 short, averaging 41.3 mm (39.3–43.2); post-orbital constriction narrow, averaging 3.8 mm (3.6–4.1) *Miniopterus inflatus*
- 3' Metacarpal of D3 long, averaging 45 mm (41.8–47.7); post-orbital constriction broad, averaging 4.1 mm (3.9–4.4) *Miniopterus africanus*
- 4 Size smaller (FA 41–46 mm; GLS 14.9–15 mm) *Miniopterus fraterculus*
- 4' Size larger (FA 43–47 mm; GLS 15–15.5 mm) *Miniopterus natalensis*

***Miniopterus africanus* Sanborn, 1936**
African Long-fingered Bat

ORIGINAL DESCRIPTION: Sanborn (1936: 111).

TYPE LOCALITY: Ethiopia, Shoa, Mulo, Sanford's Ranch, 8000 ft.

TAXONOMY: This taxon has long been treated as a synonym of *M. inflatus*, most recently by IUCN (2011). However, Peterson et al. (1995) distinguished it from subspecies of *M. inflatus*, and Simmons (2005) listed it as a valid species.

DISTRIBUTION: Ethiopia, Eritrea, Kenya, and Tanzania.

STATUS: Not Evaluated.

***Miniopterus fraterculus* Thomas and Schwann, 1906**
Lesser Long-fingered Bat

ORIGINAL DESCRIPTION: Thomas and Schwann (1906: 162).

TYPE LOCALITY: South Africa, Cape, Knysna.

STATUS: Data Deficient, population trend unknown.

Miniopterus natalensis (A. Smith, 1833)

Natal Long-fingered Bat

ORIGINAL DESCRIPTION: Smith (1833: 59).

TYPE LOCALITY: South Africa, KwaZulu-Natal, Durban ("Port Natal").

DISTRIBUTION: Distributed in East and Southern Africa from SW Arabia and Yemen, to central Ethiopia, S South Sudan, W and S Kenya, and N Tanzania to coasts of Namibia, South Africa, and Mozambique; isolated range segment in S Angola.

STATUS: Least Concern, population trend unknown.

Vespertilionidae

The vesper bats are taxonomically the most diverse family of bats; current appraisals include 47 genera and 421 species distributed on all continents save Antarctica. Their diversity defies easy characterization, but they typically have minute eyes, separate ears, a well-developed tragus, and lack a noseleaf (Fig. 13). The shape of the tragus is typically very useful in distinguishing genera and species (Fig. 14); the baculum and karyology are also very useful in this regard (Hill & Harrison, 1987; Volleth & Heller, 1994; Volleth et al., 2006). Nearly all vespertilionids are insectivorous, and most feed on flying insects. Twelve genera and 50 species occur in East Africa. Two genera, *Nycticeinops* and *Mimetillus*, are monotypic and endemic to Africa. The key to genera has been modified from Hayman and Hill (1971) and Stanley (2011); however, the cryptic nature of certain generic distinctions leaves the key incomplete.

- 1 Ears funnel-shaped, with an indentation on the outer margin just below the tip; tragus long, narrow and sharply pointed; three premolars above and below; braincase markedly domed *Kerivoula*
- 1' Ears not funnel-shaped and lacking an indentation on the trailing margin; tragus not sharply pointed; fewer premolars, or if 3/3, braincase not markedly domed 2
- 2 Six upper and six lower cheek-teeth, the anterior-most pair in each series minute; fur long, reddish or brown *Myotis*



FIG. 12. Miniopteridae, external profile of *Miniopterus inflatus rufus*. Photo by B. D. Patterson.

TAXONOMY: Eastern and southern populations may be differentiated, making *M. fraterculus* a Southern African endemic (Monadjem et al., 2010b).

DISTRIBUTION: East African distribution: E Dem. Rep. Congo, S Kenya, central Tanzania, and N Zambia south along coastal South Africa to the Cape.

STATUS: Least Concern, population trend unknown.

Miniopterus inflatus Thomas, 1903

Greater Long-fingered Bat

ORIGINAL DESCRIPTION: Thomas (1903a: 634).

TYPE LOCALITY: Cameroon, Efulen.

DISTRIBUTION: Scattered range segments in Guinea and Liberia, central Ethiopia, W and S Kenya, Cameroon, Gabon, Congo, Dem. Rep. Congo, N Zambia, SW Tanzania, Mozambique, N Namibia, and E Zimbabwe.

STATUS: Least Concern, population trend unknown.

Miniopterus minor Peters, 1867

Least Long-fingered Bat

ORIGINAL DESCRIPTION: Peters (1867b: 885).

TYPE LOCALITY: Tanzania, coast opposite Zanzibar Island.

DISTRIBUTION: Narrow and disjunct distribution in Congo and S Dem. Rep. Congo, and in SE Kenya and N Tanzania.

TABLE 19. Measurements of species of *Miniopterus* recorded from East Africa. Abbreviations and definitions for measurements listed on pages 3–4.

	<i>Miniopterus africanus</i>	<i>Miniopterus fraterculus</i>	<i>Miniopterus inflatus</i>	<i>Miniopterus minor</i>	<i>Miniopterus natalensis</i>
M	6.5	7–10	11–14.2	5.5–5.6	7.5–14.5
FA	45.4–51.7	41.4–45.7	46–49.4	35–42	43–47
ToL	122–126	92–107	115–121	93	91–123
HBL	57–66.5	50–56	51–59	47	50–63
TaL	57–64	37–56	53–58	41	38–60
TiL	19–22.6		16.5	14.4–16.3	
HF	10.3–10.8	11	10–11	9	8–10
EL	12.5–13.4	7.5–12	9–12	9	7–13
CIL		13–14.1	15.4–15.8	13.1–13.6	13.8–15.8
GLS	16.0–17.4	14.9–15.0	16–17	< 14.0	15–15.5
ZB	8.7–9.6	8	8.9–9.5	7.7	8.3–8.5
Source	Peterson et al., 1995; Lavrenchenko et al., 2004; FMNH	Monadjem et al., 2010b; Thorn et al., 2009	Monadjem et al., 2010b; Thorn et al., 2009; Rosevear, 1965	Monadjem et al., 2010b; Juste and Ibáñez, 1992; Stanley, 2011; FMNH	Monadjem et al., 2010b; Thorn et al., 2009; Stanley, 2011

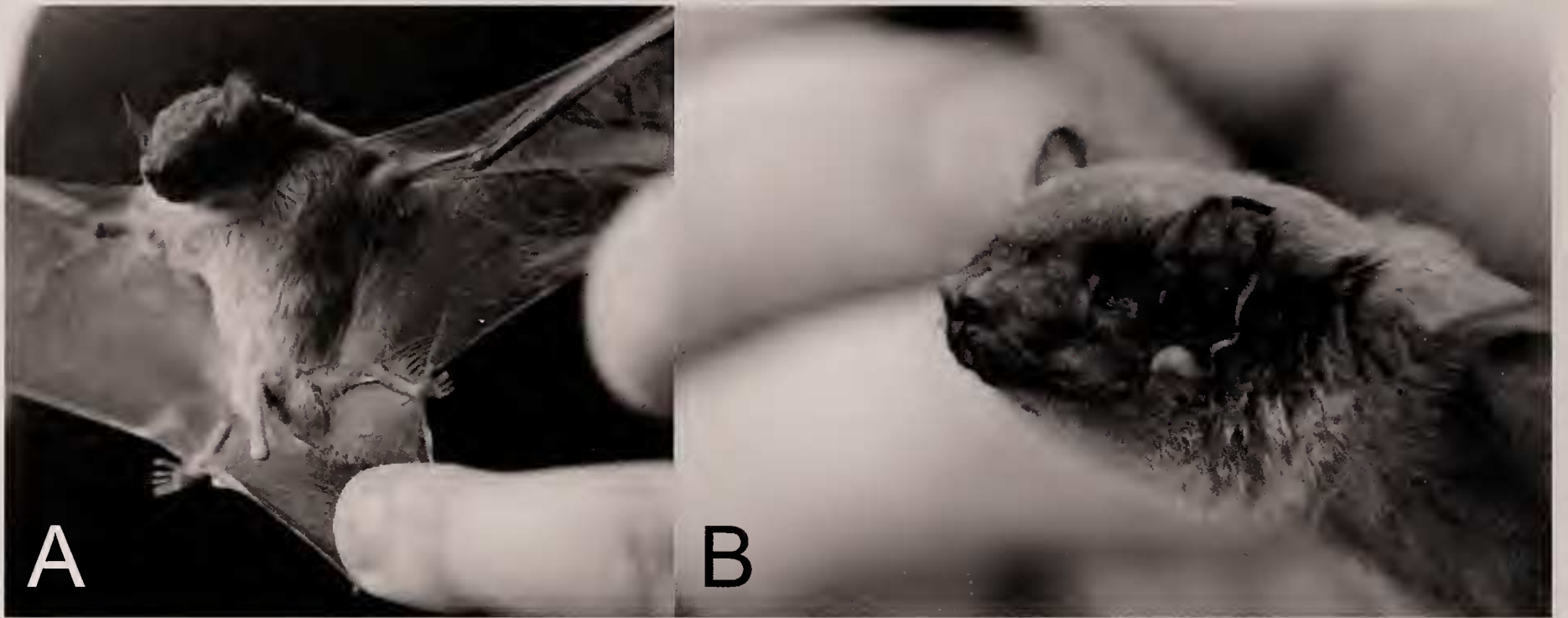


FIG. 13. Vespertilionidae, external views: (A) male *Scotoecus hirundo*; (B) oblique profile of head of *Scotophilus dinganii*. Photos by B. D. Patterson.

- | | | | | | |
|----|-------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|-----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|
| 2' | Fewer cheek-teeth, fur never reddish | 3 | 7' | Wings not narrow; skull not flattened; tragus not very short and blunt | 8 |
| 3 | Single upper incisor on each side; fur unicolored | 4 | 8 | Rostrum short and broad; braincase very high; lower lip with posterior lobe; body frequently spotted, striped, or with reticulations on wing and tail membranes. | <i>Glauconycteris</i> |
| 3' | Two upper incisors on each side; fur bi- or tricolored. | 6 | 8' | Rostrum not shortened; braincase not elevated; lower lip normal; no body or wing patterns. | 9 |
| 4 | Size larger (FA > 40 mm); anterior and middle upper molars with W-pattern obsolescent; tragus long (>7 mm) and tapering, sickle-shaped (Fig. 14O) | <i>Scotophilus</i> | 9 | Ears (>16.5 mm) about half the length of the forearm | <i>Laephotis</i> |
| 4' | Size smaller (FA < 38 mm); two anterior molars with typical W-pattern; tragus variable but short | 5 | 9' | Ears much shorter than half the length of the forearm | 10 |
| 5 | Fur short; penis exceptionally long (13 mm); tragus broad, short and club-shaped (Figs. 14G-I); slender canines | <i>Scotoecus</i> | 10 | Large (FA > 45 mm); deep chocolate brown above frosted with tannish tips | <i>Eptesicus hottentotus</i> |
| 5' | Fur longer, brown above, white below; penis shorter; tragus narrow, short and rounded (Fig. 14J); stout canines | <i>Nycticeinops schlieffeni</i> | 10' | Small (FA < 40 mm); pelage variable | <i>Neoromicia</i> |
| 6 | Two upper premolars on each side, the anterior one minute | <i>Pipistrellus</i> and <i>Hypsugo</i> | | | |
| 6' | Single upper premolar on each side. | 7 | | | |
| 7 | Wings very short and narrow; skull very flat and broad; tragus extremely short and blunt (Fig. 14F) | <i>Mimetillus moloneyi</i> | | | |

***Eptesicus hottentotus* (A. Smith, 1833)**
Long-tailed Serotine, Long-tailed House Bat

ORIGINAL DESCRIPTION: (Smith, 1833: 59).
 TYPE LOCALITY: South Africa, Cape, Uitenhage.

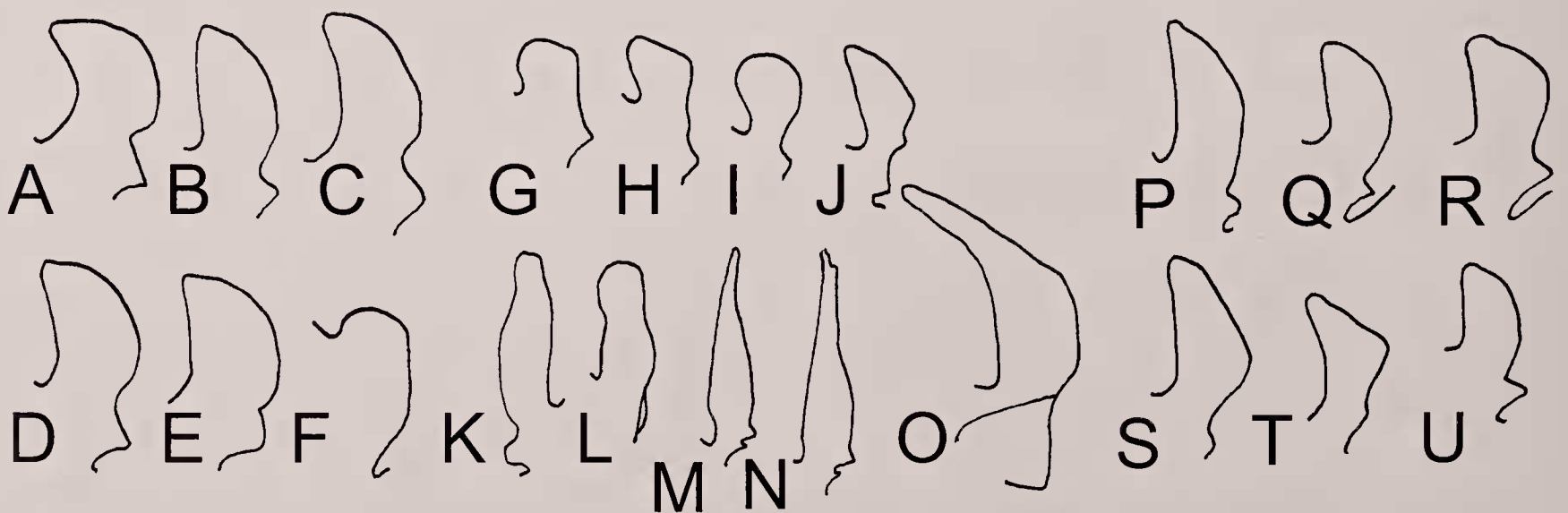


FIG. 14. Shape of the tragus in Vespertilionidae and Miniopteridae: (A) *Glauconycteris poensis*; (B) *Glauconycteris beatrix*; (C) *Glauconycteris egeria*; (D) *Glauconycteris variegata*; (E) *Glauconycteris argentata*; (F) *Mimetillus moloneyi*; (G) *Scotoecus albofuscus*; (H) *Scotoecus hindei*; (I) *Scotoecus hirundo*; (J) *Nycticeinops schlieffeni*; (K) *Myotis bocagii*; (L) *Miniopterus inflatus*; (M) *Kerivoula phalaena*; (N) *Kerivoula smithii*; (O) *Scotophilus nigrita*; (P) *Neoromicia capensis*; (Q) *Neoromicia rendalli*; (R) *Neoromicia tenuipinnis*; (S) *Neoromicia somalica*; (T) *Neoromicia nana*; (U) *Pipistrellus nanulus*. A-U redrawn from Rosevear (1965).

TABLE 20. Measurements for monotypic genera of Vespertilionidae recorded from East Africa. Abbreviations and definitions for measurements listed on pages 3–4.

	<i>Eptesicus hottentotus</i>	<i>Mimetillus moloneyi</i>	<i>Nycticeinops schlieffeni</i>
M	12–20.5	6–11.5	3.5–9
FA	44.3–53	26.5–29.5	29–35
ToL	103–135	76–92	68–89
HBL	66–71	50–60	40–56
TaL	41–58	26–32	24–37
TiL	16.7–18.4	9.5–11	7.8
HF	18.41	7	12.1–14
EL	15–20	11	10–13
CIL	17–20.1	11.8–14.5	11.8–12.9
GLS	19–21.1	13.2–14.7	12.2–13.7
ZB	12.4–13.2	9–10.3	8.2–9.0
Source	Monadjem et al., 2010b; Kearney et al., 2008; USNM	Monadjem et al., 2010b; Rosevear, 1965; Thorn et al., 2009; Stanley, 2011	Monadjem et al., 2010b; Rosevear, 1965; Thorn et al., 2009; Stanley, 2011

DISTRIBUTION: Southern African distribution, from Namibia and Botswana south to the Western Cape (South Africa) to Lesotho, and the Transvaal north to N Zambia, and an isolated record in Kenya.

STATUS: Least Concern, population trend unknown.

***Mimetillus moloneyi* (Thomas, 1891)**

Moloney's Mimic Bat, Moloney's Flat-headed Bat

ORIGINAL DESCRIPTION: (Thomas, 1891a: 528).

TYPE LOCALITY: Nigeria, Western, Lagos.

TAXONOMY: Cotterill (2001a) separated this species into a rainforest form (*moloneyi*, extending into Uganda and W Kenya) and a savanna form (*thomasi*, Southern Africa into Tanzania), but Simmons (2005) treated them as conspecific. A comprehensive revision is needed.

DISTRIBUTION: Narrow Circum-Congo distribution, from Sierra Leone east to Ethiopia (largely south of Central African Republic and South Sudan), Uganda, W and S Kenya, coastal Tanzania, Mozambique, Zimbabwe, Zambia, and Angola.

STATUS: Least Concern, population trend unknown.

***Nycticeinops schlieffeni* (Peters, 1859)**

Schlieffen's Twilight Bat

ORIGINAL DESCRIPTION: (Peters, 1859: 223).

TYPE LOCALITY: Egypt, Cairo.

DISTRIBUTION: Disjunct range segments in N Egypt, West Africa (Mauritania through Ghana to SW Chad), and NE Dem. Rep. Congo, with main range from coastal Sudan, Eritrea, Somalia, Kenya, Uganda, Tanzania, S Dem. Rep. Congo, Zambia, Mozambique, Malawi, Botswana, Namibia, and Transvaal (South Africa).

STATUS: Least Concern, population trend unknown.

Glauconycteris

The butterfly bats or silvered bats are endemic to Africa. The genus includes 12 species, nine of which have been

recorded from East Africa. They are diagnosed from other vesper bats by a fleshy lobe at the corner of the mouth that is connected by a ridge to the lobe of the ear, the variable pattern of white spots and stripes that are usually present, and their sometimes pronounced wing venation patterns (Nowak, 1999). The key is adapted from that of Rambaldini (2010).

- 1 White markings on face; uniform brown fur with white band along sides of face and on throat . . . *Glauconycteris kenyacola*
- 1' No markings present on facial fur 2
- 2 Dorsal or ventral fur extending onto uropatagium or propatagium 3
- 2' No fur present on membranes 5
- 3 Wing and tail membranes reticulated with conspicuously pigmented venation; dorsal pelage pale yellow or gray and tricolored; membranes pale and translucent
. *Glauconycteris variegata*
- 3' Wing membranes with faint or no pigmented reticulations; dorsal coloration and wing membranes varied 4
- 4 Inner margin of tragus strongly curved (Fig. 14A); white shoulder spot and dorsolateral flank stripe present
. *Glauconycteris poensis*
- 4' Inner margin of tragus straighter (Fig. 14E); white shoulder spot and dorsolateral flank stripe absent
. *Glauconycteris argentata*
- 5 Dorsal and ventral fur overall pale clay or white; patagia whitish and translucent *Glauconycteris gleni*
- 5' Dorsal and ventral fur brown or blackish brown; patagia brown or dark, not translucent 6
- 6 Inner margin of tragus concave (Fig. 14C)
. *Glauconycteris egeria*
- 6' Inner margin of tragus straight (Fig. 14B) 7
- 7 White shoulder spot conspicuous; white dorsolateral stripe present on each flank *Glauconycteris alboguttata*
- 7' White shoulder spot conspicuous or faint; dorsolateral flank stripes absent 8
- 8 Whitish shoulder spot present; ears yellowish brown; tragus short, broad, convex on outer margin, expanded at middle; TiL > 22 mm *Glauconycteris humeralis*
- 8' Color of dorsum blackish brown without paler markings; ears grayish brown; tragus long, narrow; TiL < 22 mm *Glauconycteris beatrix*

Glauconycteris alboguttata J. A. Allen, 1917
Striped Butterfly Bat

ORIGINAL DESCRIPTION: J. A. Allen in Allen et al. (1917: 449).

TYPE LOCALITY: Dem. Rep. Congo, Oriental, Medje.

DISTRIBUTION: Narrow range from Cameroon across N Gabon, N Congo, and N Dem. Rep. Congo to W Uganda.

STATUS: Least Concern, population trend unknown.

Glauconycteris argentata (Dobson, 1875)
Common Butterfly Bat, Silvered Bat

ORIGINAL DESCRIPTION: (Dobson, 1875: 385).

TYPE LOCALITY: Cameroon, Western, Cameroon Mountains.

DISTRIBUTION: Broad equatorial distribution from W Cameroon to W and S Kenya, south to N Zambia, and west to N Angola.

STATUS: Least Concern, population trend unknown.

Glauconycteris beatrix Thomas, 1901
Beatrix Butterfly Bat

ORIGINAL DESCRIPTION: (Thomas, 1901b: 256).

TYPE LOCALITY: Equatorial Guinea, Rio Muni, Benito River, 15 mi. (24 km) from mouth.

DISTRIBUTION: Disjunct West (Côte d'Ivoire and Ghana) and Central (E Nigeria to N Angola and W Uganda) African range segments (see Kityo et al., 2009a).

STATUS: Least Concern, population trend unknown.

Glauconycteris egeria Thomas, 1913
Bibundi Butterfly Bat

ORIGINAL DESCRIPTION: (Thomas, 1913b: 144).

TYPE LOCALITY: Cameroon, Western, Bibundi.

DISTRIBUTION: A narrow equatorial distribution from W Cameroon and N Dem. Rep. Congo to W Uganda.

STATUS: Data Deficient, population trend unknown.

Glauconycteris gleni Peterson and Smith, 1973
Glen's Butterfly Bat, Glen's Wattled Bat

ORIGINAL DESCRIPTION: (Peterson & Smith, 1973: 3).

TYPE LOCALITY: Cameroon, near Lomie.

DISTRIBUTION: Isolated populations known from E Cameroon and W Uganda.

STATUS: Data Deficient, population trend unknown.

Glauconycteris humeralis J. A. Allen, 1917
Spotted Butterfly Bat, Allen's Spotted Bat

ORIGINAL DESCRIPTION: J. A. Allen in Allen et al. (1917: 448).

TYPE LOCALITY: Dem. Rep. Congo, Oriental, Medje.

DISTRIBUTION: N Dem. Rep. Congo, Uganda, and W Kenya.

STATUS: Data Deficient, population trend unknown.

Glauconycteris kenyacola Peterson, 1982
Kenyacola Butterfly Bat, Kenyan Wattled Bat

ORIGINAL DESCRIPTION: (Peterson, 1982: 2521).

TYPE LOCALITY: Kenya, Coast, Galole Road, 8.5 km N Garsen.

DISTRIBUTION: Known only from the type locality near the Tana River mouth in coastal Kenya.

STATUS: Data Deficient, population trend unknown.

Glauconycteris poensis (Gray, 1842)
Abo Butterfly Bat, Abo Bat

ORIGINAL DESCRIPTION: Gray (1842: 258).

TYPE LOCALITY: Equatorial Guinea, "Fernando Po" (= Bioko).

DISTRIBUTION: Narrow coastal band in West Africa from Senegal and Sierra Leone to E Dem. Rep. Congo; an isolated population in N Tanzania near Kilimanjaro.

STATUS: Least Concern, population trend unknown.

Glauconycteris variegata (Tomes, 1861)
Variegated Butterfly Bat, Butterfly Bat

ORIGINAL DESCRIPTION: (Tomes, 1861: 36).

TYPE LOCALITY: Namibia, Otjoro.

DISTRIBUTION: Distributed in the Sahel from Senegal to Ethiopia, south in East Africa to the Transvaal (South Africa), extending west to N Namibia and north to Gabon; absent in the Congo Basin and from SW Africa.

STATUS: Least Concern, population trend unknown.

Hypsugo* and *Pipistrellus

Until recently (e.g., Hill & Harrison, 1987), the genus *Pipistrellus* included seven subgenera, five of which are now recognized as distinct genera (including *Hypsugo* and *Neoromicia*, which are found in East Africa). Even restricted in this manner, the distribution of pipistrelles extends throughout the Holarctic, Afrotropical, Indo-Malayan, and Australasian regions. There are eight African species, seven of which occur in East Africa. *Hypsugo* ranges through the Afrotropical, Palearctic, and Indo-Malayan regions, and two of the six African species are recorded in East Africa. The key to East African species of both genera has been compiled from Thorn et al. (2009), Koopman (1975), Hayman and Hill (1971), and Happold and Happold (1989). Until a more complete description is available of the holotype (and only known specimen), *P. permixtus* cannot be confidently identified using the key.

- 1 Inner upper incisor entire 2
- 1' Inner upper incisor at least weakly bifid 4
- 2 Trailing margin of wing membrane whitish
. *Pipistrellus rusticus*
- 2' Trailing margin of wing membrane blackish brown 3
- 3 Skull less robust, especially in the rostrum, with lower occipital region; anterior upper premolar sometimes visible from the side. *Pipistrellus aero*
- 3' Skull more robust, especially in the rostrum, with elevated occipital region; anterior upper premolar never visible externally *Pipistrellus hesperidus*
- 4 Anterior upper premolar displaced medially, hidden from external view by canine and posterior upper premolar . . . 5

TABLE 21. Measurements of species of *Glauconycteris* found in East Africa. Abbreviations and definitions for measurements listed on pages 3–4.

	<i>Glauconycteris alboguttata</i>	<i>Glauconycteris argentata</i>	<i>Glauconycteris beatrix</i>	<i>Glauconycteris egeria</i>	<i>Glauconycteris gleni</i>	<i>Glauconycteris humeralis</i>	<i>Glauconycteris keyyacola</i>	<i>Glauconycteris poensis</i>	<i>Glauconycteris variegata</i>
M		6–12	4–7		8.5–15		7.0	6–8	8–15.5
FA	41.5–44	37–44	35.6–41.6	37–38	40–42	35.3–39	40.5	36.5–40	40.5–46.5
ToL	94	95–108	82–99		96–103	82	98	78	90–112
HBL	52	44–59	45	43–47	52	42–50		42–50	57–65
TaL	45	45–51	35–59	38–41	45–47	38–50	49	35–45	32–52
TiL	18.3	18–19.5	16–21.3	16.5	15.1–17.0	26.8	20	16.5–18	19–21
HF	8	6–9		8–9	9	6–8	10	6–8	8–10
EL	13	10–12	7–12	13.5–16	14–15	9–11	13	10	9–15
CIL			10.8–11.7					11.6–12.2	13–14.2
GLS	12.6–13.2	10.9–12.8	11.6	13.0–13.3	14.2–14.3	10.8–11.3	12.8	11.8–12.5	13.5–14.5
ZB	9.8–10	8.3–9.4	8.5	8.6–9.0	9.6–10	8.2–8.4	9.4	8.2–8.48	8.8–10.5
Source	Allen et al., 1917; Thorn et al., 2009	Rosevear, 1965; Peterson and Smith, 1973; Thorn et al., 2009; Monadjem et al., 2010b	Rosevear, 1965; Monadjem et al., 2010b	Rosevear, 1965; Thorn et al., 2009	Thorn et al., 2009; Peterson and Smith, 1973; Peterson, 1982	Thorn et al., 2009; Allen et al., 1917	Peterson, 1982	Rodriguez et al., 2006; Rosevear, 1965; USNM	Monadjem et al., 2010b; Rosevear, 1965; Peterson, 1982

- 4' Anterior upper premolar clearly visible from the side 7
5 Tibia shorter than the femur; baculum enlarged distally; upper molars with a well-defined hypocone (rear inner cusp on an upper molar) *Pipistrellus grandidieri*
5' Tibia longer than the femur; baculum not distally enlarged; upper molars without distinct hypocone *Hypsugo*, 6
6 Larger (FA 33.7–36.5 mm); higher braincase, frontals more elevated; supraorbital region expanded so that upper surface of rostrum assumes a pentagonal shape; posterior upper incisor more than half the length of the anterior incisor; lower incisors trifold *Hypsugo eisentrauti*
6' Smaller (FA 27–32 mm); lower braincase; frontals less elevated; supraorbital region not expanded; posterior upper incisor half the length of the anterior incisor; lower incisors bifid *Hypsugo crassulus*
7 Smaller (FA < 31 mm; GLS < 12 mm); body large in proportion to FA; anterior premolar large, filling the triangular space between the canine and posterior premolar and separating them externally *Pipistrellus nanulus*
7' Larger (FA > 32.4 mm; GLS > 13 mm); more proportionate body and wings; anterior premolar smaller, less extensive, bringing canine and posterior premolar closer 8
8 Larger (M > 5.2 g; HBL > 43 mm; HF > 8 mm); pelage gray grizzled with white above and mostly whitish below *Pipistrellus rueppellii*
8' Smaller (M = 5 g; HBL = 42 mm; HF = 6 mm); coloration unknown (sole specimen preserved in spirits) *Pipistrellus permixtus*

***Hypsugo crassulus* (Thomas, 1904)**
Broad-headed Pipistrelle

ORIGINAL DESCRIPTION: Thomas (1904b: 206).
TYPE LOCALITY: Cameroon, Efulen.

TAXONOMY: As presently constituted, includes a disjunct West African taxon, *Hypsugo crassulus bellieri*, that may warrant specific distinction (see Weber & Fahr, 2007).

DISTRIBUTION: Disjunct in Liberia, Côte d'Ivoire, and Guinea in West Africa and in Cameroon, Gabon, Congo, N Angola, Dem. Rep. Congo, S South Sudan, and W Congo; isolated populations in S Uganda and W Kenya.

STATUS (AS *PIPISTRELLUS CRASSULUS*): Least Concern, population trend unknown.

***Hypsugo eisentrauti* (Hill, 1968)**
Eisentraut's Pipistrelle

ORIGINAL DESCRIPTION: Hill (1968: 45).

TYPE LOCALITY: Cameroon, Western, Rumpi Highlands, Dikume-Balue.

DISTRIBUTION: Cameroon, and scattered records in Rwanda, Uganda, Kenya, and Somalia (see Thorn et al., 2009).

STATUS (AS *PIPISTRELLUS EISENTRAUTI*): Data Deficient, population trend unknown.

***Pipistrellus aero* Heller, 1912**
Mt. Gargues Pipistrelle

ORIGINAL DESCRIPTION: Heller (1912: 3).

TABLE 22. Measurements of species of *Hypsugo* and *Pipistrellus* recorded from East Africa. Abbreviations and definitions for measurements listed on pages 3–4.

	<i>Hypsugo crassulus</i>	<i>Hypsugo eisentrauti</i>	<i>Pipistrellus aereus</i>	<i>Pipistrellus grandidieri</i>	<i>Pipistrellus hesperidus</i>	<i>Pipistrellus nanulus</i>	<i>Pipistrellus permixtus</i>	<i>Pipistrellus rueppellii</i>	<i>Pipistrellus rusticus</i>
M	5–5.5	4.5–5	4.0–5.0	6.3–11.8	4–9	3–5.4	5	5.2–7.3	3.4–5.1
FA	27–32	33.7–36.5	30.5–35.0	31–37	27–35	25–31	33.5	32.4–39.3	26.1–31.2
ToL					61–91			77–90	65–84
HBL	45–51	46	40–49	80–82	43–55	38–47	42	43–56	44–46
TaL	25–32	30–39	24–34		20–41	21–31		32–45	26–31
HF	6–7	7–8	5.2–9.8	6.6	7–8	5–7	6	8–10	6
EL	8–11	11	10.5–12.2	9.8	6–13	8–10	12.5	10–14	7.7–12
TrL				4.6			3.5		
TiL			11–12.9	13.3	12.7	10–13.5			
GLS	11–13	13.5–14.3	12.71–12.82	12.3–14.7	12.5–13.2	10.7–11.8	12.6	13.1–14	11.5–11.7
CIL			11.8–12		11.5–13.3			11.9–14	10.8–11.4
ZB	8.4–9.3	9–9.5	8.1–8.5	9.1	8.4	7.4–7.8	8.4	8.1–8.6	8.0–8.1
Posterior upper premolar visible from side?	no	yes (barely)	no	no	no	yes	yes	yes	no
Inner upper incisor	bifid	bifid	entire	bifid	entire	bifid	bifid	bifid	entire
Length of outer: inner upper incisor	0.5	0.75	<0.5	0.67	0.4		0.67		
Form of lower incisor	bifid	trifid		trifid	trifid	trifid	trifid		
Source	Thorn et al., 2009; FMNH	Hill, 1968; Thorn et al., 2007, 2009	Heller, 1912; Lavrenchenko et al., 2004; USNM	Thorn et al., 2007; Stanley, 2011	Monadjem et al., 2010b; Stanley, 2011; Thorn et al., 2009	Thorn et al., 2009; Rosevear, 1965; Monadjem et al., 2010b	Aellen, 1957; Thorn et al., 2007	Thorn et al., 2009; Monadjem et al., 2010b; Stanley, 2011	Monadjem et al., 2010b; Thorn et al., 2009

TYPE LOCALITY: Kenya, Mathews Range, summit of Mt. Gargues, 7000 ft. [2134 m].

DISTRIBUTION: Isolated populations in central Kenya (Mount Gargues; Marsabit Lake and Ngong) and N Ethiopia.

STATUS: Data Deficient, population trend unknown.

***Pipistrellus grandidieri* (Dobson, 1876)
Dobson's Pipistrelle**

ORIGINAL DESCRIPTION: Dobson (1876a: 500).

TYPE LOCALITY: Tanzania, Zanzibar Island.

TAXONOMY: This form was recognized as a distinct species by Thorn et al. (2007), who gave its diagnosis and synonymy.

DISTRIBUTION: Uganda, Kenya, Tanzania, Malawi, Burundi, S Dem. Rep. Congo, and Angola.

STATUS: Not Evaluated.

***Pipistrellus hesperidus* (Temminck, 1840)
Dusky Pipistrelle**

ORIGINAL DESCRIPTION: Temminck (1840: 211).

TYPE LOCALITY: Not precisely known, although from the Red Sea coast of Africa; probably Shewa Province [= Shoa], Ethiopia (see discussion in Kock, 2001).

DISTRIBUTION: Narrowly distributed in East Africa from Eritrea and N Somalia south through Rift Valley through Albertine Rift south through E Zambia and Zimbabwe to Durban (South Africa) and from E Uganda through W and S Kenya to coastal Tanzania; also includes scattered populations in the Cape Verde and Canary Islands, West Africa, Southwest Africa, Eastern Cape, and Madagascar.

STATUS: Least Concern, population trend unknown.

***Pipistrellus nanulus* Thomas, 1904
Tiny Pipistrelle**

ORIGINAL DESCRIPTION: Thomas (1904a: 198).

TYPE LOCALITY: Cameroon, Efulen.

DISTRIBUTION: Disjunct West African (Senegal to Gabon) and Central African (E Dem. Rep. Congo, S Uganda, W Kenya) ranges; also Bioko.

STATUS: Least Concern, population trend unknown.

***Pipistrellus permixtus* Aellen, 1957
Dar-es-Salaam Pipistrelle**

ORIGINAL DESCRIPTION: Aellen (1957: 200).

TYPE LOCALITY: Tanzania, Dar-es-Salaam.

DISTRIBUTION: Coastal Tanzania.

STATUS: Data Deficient, population trend unknown.

***Pipistrellus rueppellii* (J. Fischer, 1829)
Rüppell's Pipistrelle**

TYPE DESCRIPTION: Fischer (1829: 109).

TYPE LOCALITY: Sudan, Northern, Dongola.

DISTRIBUTION: Widely scattered ranges from Persian Gulf, Yemen, N Egypt, Lake Chad, N and W Dem. Rep. Congo, and from N Sudan along the Nile to W Kenya, the Albertine Rift, Zambia, Zimbabwe, and W Mozambique; also Zanzibar.

STATUS: Least Concern, population trend unknown.

***Pipistrellus rusticus* (Tomes, 1861)
Rusty Pipistrelle**

ORIGINAL DESCRIPTION: Tomes (1861: 35).

TYPE LOCALITY: Namibia, Damaraland, Olifants Vlei.

DISTRIBUTION: Narrow Sahelian distribution from Senegal to W Ethiopia, N Uganda, and W Kenya, with a disjunct segment in SE Angola, NE Namibia, N Botswana, W Zambia, Zimbabwe, and N South Africa.

STATUS: Least Concern, population trend unknown.

Kerivoula

Excluding four species of *Phoniscus* that are sometimes listed with them, the woolly bats include 22 species found in the tropics and subtropics of Southeast Asia (12 species), Oceania and Australasia (3), and Sub-Saharan Africa (7). Of the African species, only *K. eriophora* from central Ethiopia has not been recorded in East Africa. The genus is diagnosed by the funnel-shaped ears, long, sharply pointed tragus (Figs. 14M, N), and long, soft, woolly pelage with curly tips (Monadjem et al., 2010b). The key has been adapted from Hayman and Hill (1971) with information in Fahr (in press-b, in press-a).

- 1 Comb-like fringe of hooked, bristle-like hairs on posterior margin of interfemoral membrane. 2
- 1' Interfemoral membrane without comb-like fringe. 3
- 2 Size large (FA 34–40 mm; GLS > 15 mm): dorsal pelage usually bright reddish chestnut, below whitish or buffy (never brown). *Kerivoula argentata*
- 2' Size smaller (FA 28–33.1 mm; GLS 11.7 mm): pelage brownish or grayish brown above and below. *Kerivoula lanosa*
- 3 Larger (FA 30–36 mm): dorsal pelage grizzled. 4
- 3' Smaller (FA 26–29 mm): dorsal pelage not grizzled. 5
- 4 Outer lower incisors with simple margins; upper incisors long; tragus long (Fig. 14N). *Kerivoula smithii*
- 4' Outer lower incisors trifid; upper incisors short; tragus short. *Kerivoula cuprosa*
- 5 Fur uniformly light brown dorsally and ventrally: inner upper incisors simple. *Kerivoula phalaena*
- 5' Fur dark brown at base with grayish-brown tips: inner upper incisors bifid. *Kerivoula africana*

***Kerivoula africana* Dobson, 1878
Tanzanian Woolly Bat**

ORIGINAL DESCRIPTION: (Dobson, 1878: 335).

TYPE LOCALITY: Tanzania, Zanzibar.

DISTRIBUTION: Coastal Tanzania.

STATUS: Endangered B2ab(iii), population trend decreasing.

***Kerivoula argentata* Tomes, 1861
Damara Woolly Bat**

ORIGINAL DESCRIPTION: (Tomes, 1861: 32).

TYPE LOCALITY: Namibia, Otjoro.

DISTRIBUTION: S Kenya to SE Dem. Rep. Congo and E Angola to central Mozambique, with peripheral populations in Angola, Namibia, and Natal (South Africa).

STATUS: Least Concern, population trend unknown.

TABLE 23. Measurements and identification features of species of *Kerivoula* found in East Africa. Abbreviations and definitions for measurements listed on pages 3–4.

	<i>Kerivoula africana</i>	<i>Kerivoula argentata</i>	<i>Kerivoula cuprosa</i>	<i>Kerivoula lanosa</i>	<i>Kerivoula phalaena</i>	<i>Kerivoula smithii</i>
M		6–9	4.0–4.5	4.5–5.0		5.9–7.0
FA	28	34–40.3	30–35	28–33.1	26–29	32–36
ToL		86–101	74–83	68–90		79–93
HBL	34.3	45–51	39	37–39	33–38	39–41
TaL	34.3	40–48	40–44	30–40	35–41	40–49
TiL	11.4	7.5–10	14–15	6–7	11.5–12.5	14–16
HF	6.3		5.8–8	8.9	7–8	5.7–8.2
EL	12.7	11–16	12–14	10–13	14	11–15
TrL	7.6		5.5–7.4	7.6		7.3–9.0
CIL		13.5–14.8		9–12.9		
GLS			12.3–13.9	11.7	11.8–12.7	13.1–14.4
ZB			8.4		6.6–7.4	8.4–8.7
Inner upper incisors	bifid				simple	
Outer lower incisors	trifid		trifid		simple	simple
Source	Dobson, 1878; Fahr, in press-b	Monadjem et al., 2010b; Stanley, 2011	Fahr, in press-a. in press-b; Thorn et al., 2009	Monadjem et al., 2010b; Thorn et al., 2009; Stanley, 2011; Dobson, 1878	Thorn et al., 2009; Rosevear, 1965; Fahr, in press-b	Fahr, in press-b; Rosevear, 1965

Kerivoula cuprosa Thomas, 1912

Copper Woolly Bat

ORIGINAL DESCRIPTION: (Thomas, 1912a: 41).

TYPE LOCALITY: Cameroon, Ja River, Bitye.

DISTRIBUTION: Central Africa, in S Cameroon, N Dem. Rep. Congo, and Uganda.

STATUS: Data Deficient, population trend unknown.

Kerivoula lanosa (A. Smith, 1847)

Lesser Woolly Bat

ORIGINAL DESCRIPTION: (Smith, 1847: pl. 50).

TYPE LOCALITY: South Africa, Cape, 200 mi. (322 km) E Capetown.

DISTRIBUTION: Widespread from Guinea and Liberia to Ethiopia, south in east to Port Elizabeth (South Africa), and in west to Dem. Rep. Congo, E Angola, and Botswana.

STATUS: Least Concern, population trend unknown.

Kerivoula phalaena Thomas, 1912

Spurrell's Woolly Bat

ORIGINAL DESCRIPTION: (Thomas, 1912b: 281).

TYPE LOCALITY: Ghana, Bibianaha, 720 ft.

DISTRIBUTION: Disjunct West and Central African ranges, from Liberia to Ghana, and from Cameroon through N Dem. Rep. Congo to W Uganda.

STATUS: Least Concern, population trend unknown.

Kerivoula smithii Thomas, 1880

Smith's Woolly Bat

ORIGINAL DESCRIPTION: (Thomas, 1880: 166).

TYPE LOCALITY: Nigeria, Calabar.

DISTRIBUTION: Central African endemic ranging from E Nigeria, Cameroon, N Dem. Rep. Congo, to W Uganda, with isolated populations in Kenya.

STATUS: Least Concern, population trend unknown.

Laephotis

The four species of African long-eared bats are all endemic to the Afrotropical region, two being recorded in East Africa. They are distinguished from all other African vesper bats by the long ears (>16.5 mm, almost 50% FA) and large triangular tragus (Monadjem et al., 2010b). The key is based on the analyses of Stanley and Kock (2004).

- 1 Larger (FA 37–40 mm); anterior edge of mesopterygoid fossa lying closer to tips of pterygoid hamulars than to posterior margins of third upper molar *Laephotis wintoni*
- 1' Smaller (FA 33–38 mm); anterior edge of mesopterygoid fossa lying closer to posterior margins of third upper molar than to tips of pterygoid hamulars *Laephotis botswanae*

Laephotis botswanae Setzer, 1971

Botswanan Long-eared Bat

ORIGINAL DESCRIPTION: (Setzer, 1971: 263).

TYPE LOCALITY: Botswana, 50 mi. W, 12 mi. S Shakawe.

DISTRIBUTION: Scattered isolated populations in S Tanzania, Malawi, Mozambique, Zimbabwe, South Africa (Limpopo and Durban), W Zambia, Botswana, and Namibia.

STATUS: Least Concern, population trend unknown.

Laephotis wintoni Thomas, 1901

De Winton's Long-eared Bat

ORIGINAL DESCRIPTION: (Thomas, 1901c: 460).

TYPE LOCALITY: Kenya, Kitui, 3500 ft.

DISTRIBUTION: East African range from central Ethiopia, E Uganda, W Kenya, Tanzania, N Malawi, S Dem. Rep. Congo, to W Zambia, with an isolated population in Lesotho and Free State (South Africa).

STATUS: Least Concern, population trend unknown.

TABLE 24. Measurements of species of *Laephotis* recorded from East Africa. Abbreviations and definitions for measurements listed on pages 3–4.

	<i>Laephotis botswanae</i>	<i>Laephotis wintoni</i>
M	5–7.5	6–11
FA	33–38.2	37.2–40
ToL	90–111	91–111
HBL		52–53
TaL	40–46	38–50
HF	8	15–17
EL	16.5–21.1	21–24.8
GLS	14.5	16.05
CIL	13.8–15.1	15.6–16
ZB	8.3	8.4
Source	Monadjem et al., 2010b; Setzer, 1971	Monadjem et al., 2010b; Hayman, 1957; Lavrenchenko et al., 2004; Peterson, 1973

Myotis

The genus *Myotis* is one of the few non-commensal terrestrial mammal genera that are practically cosmopolitan, occurring on all continents save Antarctica. With 102 recognized species, it is second only to the white-toothed shrews (*Crocidura*) in species richness. Most are found in the Northern Hemisphere, and only six occur in Africa, forming a clade that also includes a single species each from the Palearctic and Indo-Malayan regions (Stadelmann et al., 2004). Three widely distributed species occur in East Africa; the key is modified from Stanley (2011) and Monadjem et al. (2010b)

- 1 FA < 44 mm; tragus blunt (Fig. 14K); pelage orange-rufous above. *Myotis bocagii*
- 1' FA > 47 mm 2
- 2 Wing bones, flanks, and uropatagium parti-colored with rufous, contrasting sharply with blackish membranes of plagiopatagium; FA > 52 mm *Myotis welwitschii*
- 2' Wings and uropatagium without a distinctive pattern of orange and black; FA < 55 mm. *Myotis tricolor*

TABLE 25. Measurements of species of *Myotis* recorded from East Africa. Abbreviations and definitions for measurements listed on pages 3–4.

	<i>Myotis bocagii</i>	<i>Myotis tricolor</i>	<i>Myotis welwitschii</i>
M	4–10	8–20	14.4–17.2
FA	36.5–40.1	47–55	52–59.3
ToL	36.5–42.8	95–121	105–127
HBL	87–105	52–58	62–69
TaL	42–60	35–55	45–65
HF	9–11	10–12	10–14
EL	13–16.5	14–20	19–25.5
TrL			10–12
TiL	19.6–20.3		15–26
CIL	14–15.2	16.6–18.5	18.1–19.4
GLS	14.1–15.2	17–19.3	19.9
ZB	8.4–8.9	8.5–9.5	13.5
Source	Monadjem et al., 2010b; Rosevear, 1965; Thorn et al., 2009; Stanley, 2011	Monadjem et al., 2010b; Thorn et al., 2009; Stanley, 2011	Monadjem et al., 2010b; Thorn et al., 2009; FMNH

Myotis bocagii (Peters, 1870)

Rufous *Myotis*, Rufous Mouse-eared Bat

ORIGINAL DESCRIPTION: (Peters, 1870: 125).

TYPE LOCALITY: Angola, Duque de Braganca.

DISTRIBUTION: Widely scattered localities from Yemen south to the Transvaal (South Africa) through every East African country, along the Albertine Rift north to S South Sudan, and from Senegal to Angola in West Africa.

STATUS: Least Concern, population trend unknown.

Myotis tricolor (Temminck, 1832)

Temminck's *Myotis*, Cape Hairy Bat

ORIGINAL DESCRIPTION: (Temminck, 1832: 106).

TYPE LOCALITY: South Africa, Cape, Capetown.

DISTRIBUTION: Ethiopia through East Africa south to the W Cape (South Africa), extending into Zambia, E Angola, and S Dem. Rep. Congo.

STATUS: Least Concern, population trend unknown.

Myotis welwitschii (Gray, 1866)

Welwitsch's *Myotis*, Welwitsch's Bat

ORIGINAL DESCRIPTION: (Gray, 1866: 211).

TYPE LOCALITY: Angola.

DISTRIBUTION: Ethiopia through East Africa to South Africa and Lesotho, extending west to include Zambia and central Angola. Also West African records in Gambia.

STATUS: Least Concern, population trend unknown.

Neoromicia

The serotines and banana bats (*Neoromicia*) are an endemic African group. Treated as species of *Pipistrellus* by the IUCN (2011), they were separated by Volleth et al. (2001) on chromosomal grounds. Of the 10 species, only *Neoromicia brunneus* does not occur in East Africa. Following Thorn et al. (2009), we consider *N. flavescens* a synonym of *P. grandidieri*. The key, which is modified from Hayman and Hill (1971), is grossly incomplete, because of uneven descriptions and comparisons of these taxa in the literature.

The nine East African species were described in six different genera! *Neoromicia* cf. *melckorum*, *N. guineensis*, *N. helios*, and *N. somalica* cannot be identified using this key. *Neoromicia* cf. *melckorum* resembles *N. capensis*, but is somewhat larger and with a distinct karyotype (Monadjem et al., 2010b), *N. helios* was originally diagnosed by dark wing membranes edged in white (Heller, 1912), *N. guineensis* by its fur brown above and below, except in the pubic region and at the edges of the flight membranes, which are whitish tinged with fawn (Bocage 1889), and *N. somalica* by its fur being blackish slate basally (for two-thirds of its length), tipped dorsally with buff and ventrally with dull white (Thomas 1901d).

- 1 Wing membranes white, buff, or translucent 2
- 1' Wing membranes dark 3
- 2 Dorsal pelage blackish brown, belly with white tips over black roots; dorsum sharply contrasting with wings; FA 28–33 mm; GLS 12–13.2 mm *Neoromicia tenuipinnis*
- 2' Dorsal pelage paler, less contrasting with belly and wings; FA 31–38 mm; GLS 13.5–13.8 mm . . . *Neoromicia rendalli*
- 3 Tragus hatchet-shaped (sharp angle on posterior margin; Fig. 14T) *Neoromicia nana*
- 3' Tragus not so sharply angled (e.g., Fig. 14P) 4
- 4 Cranial portion of skull not elevated; occiput with “helmet” formed by occipital and parietal bones *Neoromicia capensis*
- 4' Cranial portion of skull elevated above rostrum; without occipital helmet *Neoromicia zuluensis*

***Neoromicia capensis* (A. Smith, 1829)**
Cape Serotine

ORIGINAL DESCRIPTION: (Smith, 1829: 435).
TYPE LOCALITY: South Africa, Cape, Grahamstown.
DISTRIBUTION: Widespread in Sub-Saharan Africa from Guinea-Bissau to E Sudan and Eritrea south to the Cape

(South Africa), excluding only the Karoo and coastal Namib deserts.

STATUS (AS *PIPISTRELLUS CAPENSIS*): Least Concern, population trend stable.

***Neoromicia guineensis* (Bocage, 1889)**
Guinean Serotine, Tiny Serotine

ORIGINAL DESCRIPTION: (Bocage, 1889: 6).
TYPE LOCALITY: Guinea-Bissau, Bissau.

DISTRIBUTION: West and Central Africa, from Senegal to S South Sudan, W Ethiopia, N Uganda, and NE Dem. Rep. Congo; another range segment in S Dem. Rep. Congo and Congo.

STATUS (AS *PIPISTRELLUS GUINEENSIS*): Least Concern, population trend unknown.

***Neoromicia helios* (Heller, 1912)**
Samburu Pipistrelle, Heller’s Pipistrelle

ORIGINAL DESCRIPTION: (Heller, 1912: 3).
TYPE LOCALITY: Kenya, 30 mi. S Mount Marsabit, Merelle Water.

DISTRIBUTION: East African endemic, in S Somalia, most of Kenya, NE Uganda, and S South Sudan, plus an isolated population in Djibouti.

STATUS (AS *PIPISTRELLUS HELIOS*): Data Deficient, population trend unknown.

***Neoromicia* cf. *melckorum* (Roberts, 1919)**
Melcks’ Serotine, Melcks’ House Bat

ORIGINAL DESCRIPTION: (Roberts, 1919: 113).
TYPE LOCALITY: South Africa, Cape, Berg River, Kersfontein.
TAXONOMY: This is an apparently undescribed species. Kearney (2005) showed that true *N. melckorum* is a synonym

TABLE 26. Measurements of species of *Neoromicia* recorded in East Africa. Abbreviations and definitions for measurements listed on pages 3–4.

	<i>Neoromicia capensis</i>	<i>Neoromicia guineensis</i>	<i>Neoromicia helios</i>	<i>Neoromicia</i> cf. <i>melckorum</i>	<i>Neoromicia nana</i>	<i>Neoromicia rendalli</i>	<i>Neoromicia somalica</i>	<i>Neoromicia tenuipinnis</i>	<i>Neoromicia zuluensis</i>
M	3.4–9.2		2–4	9	2–6.5	6–10.8	3–5	3–5.5	4–4.9
FA	26–39	26–29	25–32.5	29–38.7	25–34.1	31–37.9	27.5–32.5	28–33	28.3–33.3
ToL	60–107		76	96–101	61–94	91–102	75–85	64–87	70–86
HBL	43–54	35–48	36–45		41–47	45–59	46–51	37.5–53	
TaL	18–40	25–35	24–41	29.7–37.5	23–41	33–45	29–36.5	26–34	30–38
HF	6–7.5	7	5	6.8–8.3	6–7	7–9	6–7	7	
TiL	13.4	10	9	12.2–13.5	10–13.5		11–13		11.9–14
EL	7–15	9–11	9	10–12	6.9–12	10–14	10–12	8–12	9–12
CIL	11.7–15.5		10.6	14.2–15.0	10.3–11.6	12.8–13.2	11–12.3		11.3–12.3
GLS	12.4–14.9	11.0–11.9	11		11–12.5	13.5–13.8	11.7–12.8	12–13.2	
ZB	7.9–8.5	7	7		6.7–7.3	8.8–9	7.3–8.1	7.5–8.3	
Source	Monadjem et al., 2010b; Thorn et al., 2009; Rosevear, 1965; Stanley, 2011	Rosevear, 1965; Thorn et al., 2009; Stanley, 2011	Stanley, 2011; Heller, 1912; USNM specimens	Monadjem et al., 2010b; Stanley, 2011; Bates et al., 2006	Monadjem et al., 2010b; Thorn et al., 2009; Rosevear, 1965; Stanley, 2011	Monadjem et al., 2010b; Thorn et al., 2009; Stanley, 2011	Rosevear, 1965; Goodman and Ranivo, 2004; Thorn et al., 2009; Stanley, 2011	Monadjem et al., 2010b; Thorn et al., 2009; Rosevear, 1965; Stanley, 2011	Monadjem et al., 2010b; Stanley, 2011

of *N. capensis*, but the application of this finding to other parts of its apparent range is uncertain, as other authors noted specific or subspecific differences of populations elsewhere (Hayman & Hill, 1971; Monadjem et al., 2010b).

DISTRIBUTION: S Tanzania, E Zambia, E Zimbabwe, N South Africa, and Mozambique; also in Madagascar.

STATUS (AS *PIPISTRELLUS MELCKORUM*): Data Deficient, population trend unknown.

Neoromicia nana (Peters, 1852)

Banana Pipistrelle

ORIGINAL DESCRIPTION: (Peters, 1852: 63).

TYPE LOCALITY: Mozambique, Inhambane, 24°S.

DISTRIBUTION: Widespread south of the Sahara, but absent from most of Namibia, Botswana, and western South Africa; from Senegal to South Sudan, south to the Transvaal (South Africa); range includes virtually all of Dem. Rep. Congo, Tanzania, Zambia, and Angola.

STATUS (AS *PIPISTRELLUS NANUS*): Least Concern, population trend unknown.

Neoromicia rendalli (Thomas, 1889)

Rendall's Serotine

ORIGINAL DESCRIPTION: (Thomas, 1889: 362).

TYPE LOCALITY: Gambia, Gambia River, Bathurst.

DISTRIBUTION: Sahelian distribution from Senegal to E South Sudan, through Rift Valley and Albertine Rift to N Botswana, Zimbabwe, and Mozambique; distributed along the coast from central Tanzania to Somalia.

STATUS (AS *PIPISTRELLUS RENDALLI*): Least Concern, population trend unknown.

Neoromicia somalica (Thomas, 1901)

Somali Serotine

ORIGINAL DESCRIPTION: (Thomas, 1901d: 32).

TYPE LOCALITY: Somalia, Northwest, Hargeisa, 3500 ft. (~1070 m).

TAXONOMY: Records of this species from Namibia and South Africa reflect the former inclusion of *Neoromicia zuluensis* as a subspecies or synonym.

DISTRIBUTION: Sahelian distribution from Senegal and Guinea-Bissau to Eritrea and N Somalia, south to Kinshasa (Dem. Rep. Congo) and east to N Tanzania, S Kenya, and S Somalia.

STATUS (AS *PIPISTRELLUS SOMALICUS*): Least Concern, population trend unknown.

Neoromicia tenuipinnis (Peters, 1872)

White-winged Serotine

TYPE DESCRIPTION: (Peters, 1872b: 263).

TYPE LOCALITY: Guinea.

DISTRIBUTION: Narrowly distributed from Senegal to S South Sudan and SW Ethiopia, W Kenya, N Tanzania through most of Dem. Rep. Congo into N Angola.

STATUS (AS *PIPISTRELLUS TENUIPPINNIS*): Least Concern, population trend unknown.

Neoromicia zuluensis (Roberts, 1924)

Zulu Serotine

ORIGINAL DESCRIPTION: (Roberts, 1924: 60).

TYPE LOCALITY: South Africa, Zululand, White Umfolosi Game Reserve.

TAXONOMY: Some records in East Africa may reflect the former synonymy of this species with *N. somalica*. A comprehensive revision is needed.

DISTRIBUTION: Disjunct ranges in East Africa (Ethiopia, S South Sudan, E Uganda, W Kenya) and Southern Africa (N Namibia, N Botswana, S Angola, Zambia, Zimbabwe, Malawi, E South Africa).

STATUS (AS *PIPISTRELLUS ZULUENSIS*): Least Concern, population trend unknown.

Scotoecus

The lesser house bats can easily be distinguished from all other vesper bats by the large size of the penis. There are five species—all but the Southwest Asian *S. pallidus* are African, and all of those occur in East Africa. Two of these, *S. hindei* and *S. albigula*, are part of an unresolved species complex (Monadjem et al., 2010b); uncertainties in reported measurements led us to tabulate their reported measurements together (see Table 27). *Scotoecus* species all have a broad rostrum, particularly across the lacrymals, and a broad, flat anterior surface of the upper canines (Hayman & Hill, 1971; Nowak, 1999). The key is modified from Hayman and Hill (1971) and Thorn et al. (2009) using Cotterill (2001b); the distinction between *albigula* and *hindei* is based on Happold and Happold (1989).

- 1 Wings pale, white or buff between forearm and fingers and brown laterally; four upper cheek-teeth *Scotoecus albofuscus*
- 1' Wing membranes dark; four to five upper cheek-teeth 2
- 2 Smaller (FA 29–33.5 mm), with small cheek-teeth and skulls (GLS 12.5–14.3 mm); medium brown above, gradually paler to mid-belly *Scotoecus hirundo*
- 2' Larger (FA > 32.2 mm, with larger cheek-teeth and skulls (GLS 15.5–16.0 mm); color as above, sometimes pure white on throat or belly 3
- 3 Smaller, GLS 13.5–15 mm; canine and cheek-teeth massive, canine-third molar length about 6.1 mm; mandible length about 11.5 mm *Scotoecus albigula*
- 3' Larger, GLS 15.0–15.5 mm; canine and cheek-teeth less massive; canine-third molar length about 5.4 mm; ML about 10.3 mm *Scotoecus hindei*

Scotoecus albigula Thomas, 1909

White-throated Lesser House Bat, White-bellied Lesser House Bat

ORIGINAL DESCRIPTION: Thomas (1909a: 544).

TYPE LOCALITY: Kenya, Western, Mount Elgon, Kirui, 6000 ft.

TAXONOMY: The species-level distinction of *S. albigula* was affirmed by Happold and Happold (1989), Taylor and Van der Merwe (1998), and Cotterill (2001b). Thorn et al. (2009) treated this species as a subspecies of *S. hindei*.

TABLE 27. Measurements of species of *Scotoecus* recorded from East Africa. Abbreviations and definitions for measurements listed on pages 3–4.

	<i>Scotoecus albigula</i> & <i>S. hindei</i>	<i>Scotoecus albofuscus</i>	<i>Scotoecus hirundo</i>
M	8–11	9.5	
FA	32.2–38.5	30–34.1	30–33.5
ToL	87–93	85	
HBL	53–61	50	46–63
TaL	31–37	30–32	30–35
TiL	12.6–14	10–14.4	11–13
HF	7–9	8	
EL	9–13.5	9–10	
CIL	13.8–15.1	14.2	
GLS	15.0–16.1	13.3–14.4	13–14.3
ZB	11.0–11.7	9–10.2	9.2–10.6
Belly color	whitish to buffy	umber brown	silvery white
Source	Cotterill, 2001b; Thorn et al., 2009; Monadjem et al., 2010b	Monadjem et al., 2010b; Rosevear, 1965; Thorn et al., 2009; Stanley, 2011	Rosevear, 1965; Thorn et al., 2009; Stanley, 2011; Kock et al., 2002

DISTRIBUTION: Angola, Zambia, Mozambique, Uganda, Kenya, Malawi, Somalia (Simmons, 2005).

STATUS: not listed; treated by IUCN (2011) as a synonym of *S. hirundo*.

Scotoecus albofuscus (Thomas, 1890)

Light-winged Lesser House Bat

ORIGINAL DESCRIPTION: Thomas (1890: 84).

TYPE LOCALITY: Gambia, River Gambia, Bathurst.

DISTRIBUTION: Disjunct West African (Senegal and Gambia to E Nigeria) and East African (Uganda, W Kenya, Tanzania, E Dem. Rep. Congo, E Zambia, Malawi, Mozambique, to KwaZulu-Natal, South Africa) range segments.

STATUS: Data Deficient, population trend unknown.

Scotoecus hindei Thomas, 1901

Hinde's Lesser House Bat

ORIGINAL DESCRIPTION: Thomas (1901a: 264).

TYPE LOCALITY: Kenya, Eastern, Kitui, 3500 ft.

TAXONOMY: The species-level distinction of *S. hindei* was affirmed by Happold and Happold (1989), Taylor and Van der Merwe (1998), and Cotterill (2001b).

DISTRIBUTION: Nigeria and Cameroon to S South Sudan and Somalia; south to SE Dem. Rep. Congo, Kenya, Tanzania, Zambia, Mozambique, Malawi (Simmons, 2005).

STATUS: not listed; treated by IUCN (2011) as a synonym of *S. hirundo*.

Scotoecus hirundo (de Winton, 1899)

Dark-winged Lesser House Bat

ORIGINAL DESCRIPTION: de Winton (1899: 355).

TYPE LOCALITY: Ghana, Gambaga, 1300 ft.

TAXONOMY: IUCN (2011) showed the range of this species extending to Angola, Zambia, and Mozambique, but this was based on the synonymy of *S. albigula* and *S. hindei* with *S. hirundo*.

DISTRIBUTION: Narrow Sahelian distribution from Senegal to W Ethiopia, N Uganda, S Somalia, Kenya, and E Tanzania.

STATUS: Least Concern, population trend unknown.

Scotophilus

The house bats or yellow bats include 13 or 14 species found in southern Asia (four species), Madagascar and Réunion (four species), and continental Africa (five or six species; we follow Thorn et al. [2009] in considering at least Ugandan records of *S. nucella* as indistinguishable from *S. nux*). All five African species are present in East Africa, often in close association with humans. The key is based on Stanley (2011), Goodman et al. (2005), and Happold and Happold (1989).

- 1 FA > 70 mm; GLS > 25 mm *Scotophilus nigrita*
- 1' FA < 60 mm; GLS < 25 mm 2
- 2 Throat and belly pale (white, cream, or grayish); tragus short (8–9 mm); FA ≤ 51 mm; GLS ≤ 18 mm
. *Scotophilus viridis*
- 2' Chest and belly variable (white, brown, or yellow); tragus long (>9 mm); FA ≥ 48 mm 3
- 3 Light to medium brown on back, off-white to dirty brown on throat and belly *Scotophilus leucogaster*
- 3' Olive to dark brown above, yellow or medium brown on throat and belly 4
- 4 Olive brown above, bright yellow or orange-yellow below *Scotophilus dinganii*
- 4' Dark brown above, medium brown on throat and belly
. *Scotophilus nux*

Scotophilus dinganii (A. Smith, 1833)

Yellow-bellied House Bat, African Yellow Bat

ORIGINAL DESCRIPTION: Smith (1833: 59).

TYPE LOCALITY: South Africa, KwaZulu-Natal, Durban (“Port Natal”).

TAXONOMY: As listed here, *S. dinganii* is a species complex, composed of two or three biological species. Although its geographic range is imprecisely known, the East African form, *S. d. colias*, may deserve elevation to specific rank as *S. colias* (see Vallo et al., 2011b).

DISTRIBUTION: Broad Sahelian distribution from Senegal and Gambia to Eritrea, Djibouti, south to KwaZulu-Natal (South Africa) and west to include most of Namibia, Angola, and the Congo delta.

STATUS: Least Concern, population trend unknown.

TABLE 28. Measurements of species of *Scotophilus* recorded from East Africa. Abbreviations and definitions for measurements listed on pages 3–4.

	<i>Scotophilus dinganii</i>	<i>Scotophilus leucogaster</i>	<i>Scotophilus nigrita</i>	<i>Scotophilus nux</i>	<i>Scotophilus viridis</i>
M	15.2–37	13–23	88–91	26–38	14–18
FA	42–58	43–51.9	77.5–88	55.4–60.4	42.4–50.1
ToL	92–146	115–126	187–195	125–146	110–124
HBL	79–82	56–70	108–119	75–86	67–76
TaL	29–63	37–55	68–80	47–60	41–49
HF	11–12	11–12	17–19	13–15	9–11
EL	11–19	14–16	21–23	16–17	11–17
TiL	22.9–25.5				
CIL	18.2–20.8	16.6–17.4	24.6–28.5	18.4–19.6	15.5–17.4
GLS	19.7–21.2		28.5–32.1	16.8–17.6	16.8–17.6
ZB	14.1–15	12.7–13.8	19.8–21.7	14.4–15.4	12.5–13.1
Source	Monadjem et al., 2010b; Thorn et al., 2009; Stanley, 2011	Monadjem et al., 2010b; Stanley, 2011; FMNH; Robbins et al., 1985	Robbins et al., 1985; de Vree, 1973; Stanley, 2011; Robbins, 1978	Robbins et al., 1985; Thorn et al., 2009	Robbins et al., 1985; Thorn et al., 2009; Stanley, 2011

***Scotophilus leucogaster* (Cretzschmar, 1830)**
White-bellied House Bat

ORIGINAL DESCRIPTION: Cretzschmar (1830–1831: 71).

TYPE LOCALITY: Sudan, Kordofan, Bir Nedger (“Brunnen Nedger” = Nedger Well).

DISTRIBUTION: The nominate form has a Sahelian distribution from Senegal and Mauritania to E Ethiopia, W Kenya, Uganda, and N Dem. Rep. Congo. There is a disjunct southern range segment, which includes border areas of Angola, Namibia, Zambia, Botswana, and Zimbabwe and isolated populations in adjacent areas of these countries, South Africa and Mozambique, to which the name *damarensis* may apply (A. Monadjem, pers. comm.).

STATUS: Least Concern, population trend unknown.

***Scotophilus nigrita* (Schreber, 1775)**
Giant House Bat, Schreber’s Yellow Bat

ORIGINAL DESCRIPTION: Schreber (1775: 171).

TYPE LOCALITY: Senegal.

DISTRIBUTION: Disjunct ranges in West Africa (Senegal to W Nigeria) and East Africa (SE Kenya to E Dem. Rep. Congo south to E Zimbabwe and S Mozambique), with an isolated population in S Sudan.

STATUS: Least Concern, population trend decreasing.

***Scotophilus nux* Thomas, 1904**
Nut-colored House Bat, Nut-colored Yellow Bat

ORIGINAL DESCRIPTION: Thomas (1904b: 208).

TYPE LOCALITY: Cameroon, Efulen.

DISTRIBUTION: Narrow equatorial distribution from high forest zones from Sierra Leone to Ghana and from SE Nigeria to W Uganda, and W Kenya.

STATUS: Least Concern, population trend unknown.

***Scotophilus viridis* (Peters, 1852)**
Green House Bat, Greenish Yellow Bat

ORIGINAL DESCRIPTION: Peters (1852: 67).

TYPE LOCALITY: Mozambique, Mozambique Island, 15°S.

DISTRIBUTION: Sahelian distribution from Senegal and Gambia to W Ethiopia south to St. Lucia (South Africa) and west to W Zambia.

STATUS: Least Concern, population trend unknown.

Species Sometimes Listed in the East African Bat Fauna

A number of species listed by other authorities as members of the East African bat fauna have been excluded from the foregoing. Here, we list those species and justify our exclusions.

***Epomophorus gambianus* (Ogilby, 1835)**
Gambian Epauletted Fruit Bat

ORIGINAL DESCRIPTION: Ogilby (1835: 100).

TYPE LOCALITY: Gambia: Banjul.

TAXONOMY: Although Bergmans (1988) offered a very useful analysis of morphometric variation in *Epomophorus*, it is not without problems (cf. Claessen & de Vree, 1991), and genetic variation must be incorporated in *Epomophorus* taxonomy to reconcile the different ranges given for this form in Simmons (2005), Kityo et al. (2009a), and IUCN (2011). Until such a revision, we follow IUCN (2011) in treating it as extralimital to East Africa.

DISTRIBUTION: Ranging continuously from Senegal and Sierra Leone in the west through mainly savanna habitats to Central African Republic, South Sudan, and W Ethiopia; narrowly distributed in northernmost Dem. Rep. Congo (IUCN, 2011).

STATUS: Least Concern, population trend unknown.

***Epomophorus minor* Dobson, 1880**
Minor Epauletted Fruit Bat

ORIGINAL DESCRIPTION: Dobson (1880: 715).

TYPE LOCALITY: Tanzania, Zanzibar Island.

TAXONOMY: Thorn et al. (2009) listed various uses of this name in the synonymy of *minimus*, while IUCN (2011) regarded *minor* as a synonym of *labiatus*, a problem created by Temminck’s use of co-types in describing *labiatus* (see Bergmans, 1988). Additional revisionary work is surely needed.

DISTRIBUTION: Ethiopia, Somalia, South Sudan, Kenya, Rwanda, SE Dem. Rep. Congo, Zambia, Tanzania, Zanzibar, Uganda, Malawi.

TABLE 29. Bat species not yet recorded in East Africa but reported from neighboring countries. Data sources: Simmons (2005), IUCN (2011), and Monadjem et al. (2010a).

	Dem. Rep. Congo	Ethiopia	Malawi	Mozambique	Somalia	South Sudan	Zambia
Pteropodidae							
<i>Epomophorus gambianus</i> (Ogilby, 1835)	+	+				+	
<i>Micropteropus intermedius</i> Hayman, 1963	+						
<i>Plerotes anchietae</i> (Seabra, 1900)	+		+				+
<i>Scotonycteris zenkeri</i> Matschie, 1894	+						
Rhinolophidae							
<i>Rhinolophus hipposideros</i> (Bechstein, 1800)		+				+	
<i>Rhinolophus sakejiensis</i> Cotterill, 2002							+
Hipposideridae							
<i>Asellia patrizii</i> De Beaux, 1931		+					
Rhinopomatidae							
<i>Rhinopoma hardwickii</i> Gray, 1831		+			+	+	
<i>Rhinopoma microphyllum</i> (Brünnich, 1782)		+				+	
Nycteridae							
<i>Nycteris major</i> (K. Andersen, 1912)							+
<i>Nycteris parisii</i> De Beaux, 1924		+			+		
<i>Nycteris vinsoni</i> Dalquest, 1965				+			
Molossidae							
<i>Mops niangarae</i> J. A. Allen, 1917	+						
<i>Mops spurrelli</i> (Dollman, 1911)	+						
<i>Mormopterus acetabulosus</i> (Hermann, 1804)		+					
<i>Myopterus daubentonii</i> Desmarest, 1820	+						
<i>Sauromys petrophilus</i> (Roberts, 1917)				+			
Vespertilionidae							
<i>Eptesicus bottae</i> (Peters, 1869)					+		
<i>Eptesicus floweri</i> (de Winton, 1901)						+	
<i>Glauconycteris superba</i> Hayman, 1939	+						
<i>Hypsugo anchietae</i> (Seabra, 1900)				+			+
<i>Hypsugo musciculus</i> Thomas, 1913	+						
<i>Kerivoula eriophora</i> (Heuglin, 1877)		+					
<i>Myotis morrissi</i> Hill, 1971*		+					
<i>Myotis scotti</i> Thomas, 1927		+					
<i>Pipistrellus deserti</i> Thomas, 1902					+		
<i>Pipistrellus inexpectatus</i> Aellen, 1959						+	
<i>Plecotus balensis</i> Kruskop and Lavrenchenko, 2000		+					

* Name published in Hill and Morris (1971).

STATUS: Not Evaluated.

***Miniopterus schreibersii* (Kuhl, 1817)**
Schreibers' Long-fingered Bat

ORIGINAL DESCRIPTION: Kuhl (1817: 14).

TYPE LOCALITY: Romania, Mountains of Banat, Banat, near Coronini, Kolumbacs Cave (= Kulmbazer Cave = Columbăzar Cave).

TAXONOMY: East African records are apparently based on the mistaken former synonymy of *M. natalensis* with *M. schreibersii*.

DISTRIBUTION: Morocco and Algeria through S Europe north to Austria and east to Azerbaijan, south to Israel and Jordan; scattered populations in West Africa from Guinea to Cameroon.

STATUS: Near Threatened, population trend decreasing.

***Neoromicia flavescens* (Seabra, 1900)**
Yellow Serotine

ORIGINAL DESCRIPTION: Seabra (1900: 23).

TYPE LOCALITY: Angola, Galanga.

TAXONOMY: Although East African records certainly exist, this name is apparently a synonym of *Pipistrellus (Afropipistrellus) grandidieri* (see Thorn et al., 2007), covered in the species treatments.

DISTRIBUTION: Isolated and widely scattered populations in Angola, Cameroon, Somalia, Uganda, Burundi, Malawi, and Mozambique.

STATUS (AS *PIPISTRELLUS FLAVESCENS*): Data Deficient, population trend unknown.

***Pipistrellus deserti* Thomas, 1902**
Desert Pipistrelle

ORIGINAL DESCRIPTION: Thomas (1902: 2).

TYPE LOCALITY: Libya, Fezzan, Murzuk.

TAXONOMY: Although this bat has been recorded from East Africa and may occur there, records need to be verified against the plethora of other *Pipistrellus*, *Neoromicia*, and *Hypsugo* species that are known to occur there (see also Koopman, 1975).

DISTRIBUTION: Egypt, N Sudan, Libya, Algeria, Morocco; in addition, IUCN (2011) depicts records south of the Sahara from Burkina Faso and Ghana to Kenya and Somalia.

STATUS: Least Concern, population trend unknown.

***Pipistrellus inexpectatus* Aellen, 1959**

Aellen's Pipistrelle

ORIGINAL DESCRIPTION: Aellen (1959: 226).

TYPE LOCALITY: Cameroon, Upper Bénoué Valley, Ngaouyanga.

TAXONOMY: Specimens from Kenya, Uganda, and Dem. Rep. Congo previously referred to this species apparently represent *Hypsugo eisentrauti* (Koopman et al., 1995; Thorn et al., 2009).

DISTRIBUTION: West African distribution from Sierra Leone and Guinea to N Cameroon.

STATUS: Data Deficient, population trend unknown.

***Pipistrellus kuhlii* (Kuhl, 1817)**

Kuhl's Pipistrelle

ORIGINAL DESCRIPTION: Kuhl (1817: 14).

TYPE LOCALITY: Italy, Friuli-Venezia Giulia, Trieste.

TAXONOMY: Records of *P. kuhlii* from Sub-Saharan Africa are erroneous, most being referable to *P. hesperidus*. Because other *Pipistrellus*, *Neoromicia*, and *Hypsugo* species have also been identified as *P. kuhlii*, each Sub-Saharan voucher specimen needs to be reviewed.

DISTRIBUTION: Widespread Mediterranean and Near East distribution east to Kazakhstan and Pakistan and south to Yemen and W Madagascar; absent in Sub-Saharan Africa.

STATUS: Least Concern, population trend unknown.

***Scotophilus nucella* Robbins, 1983**

Robbins' House Bat

ORIGINAL DESCRIPTION: Robbins (1983: 19).

TYPE LOCALITY: Ghana, Eastern, 1 mi. N Nkawkaw.

TAXONOMY: Thorn et al. (2009) regarded the isolated population in W Uganda formerly identified under this name as inseparable from *S. nux*; the isolated population from E Tanzania needs to be re-examined.

DISTRIBUTION: West Africa, from Côte d'Ivoire and Ghana; unconfirmed records E Tanzania.

STATUS: Data Deficient, population trend unknown.

Species That May Eventually Be Added To the East African Bat Fauna

A number of bat species occur in neighboring nations but have not yet been recorded in East Africa. Table 29 contains a list of 28 species that, on geographic grounds, are prospective additions to the East African bat fauna.

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Appendix 1

Distribution matrix for 211 species of bats among 18 African countries; 1 is used to denote a species' documented presence. Data source: largely IUCN (2011) distributions as summarized by Wikipedia (2011) accounts for countries outside of East Africa. Alterations to the Wiki-reported faunas of Burundi, Rwanda, and Congo were made with records from Hayman et al. (1966); of Tanzania with Stanley (2011); of Uganda with Thorn et al. (2009); and of Mozambique with Monadjem et al. (2010a).

	East Africa									Neighboring and exemplar African nations								
	Burundi	Kenya	Rwanda	Tanzania	Uganda	Cameroon	Côte d'Ivoire	Dem. Rep. Congo	Egypt	Ethiopia	Libya	Malawi	Mozambique	Nigeria	Somalia	South Africa	South Sudan	Zambia
Pteropodidae																		
<i>Casinycotis argyris</i> Thomas, 1910	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
<i>Eidolon helvum</i> (Kerr, 1792)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
<i>Epomophorus crypturus</i> Peters, 1852	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
<i>Epomophorus gambianus</i> (Ogilby, 1835)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
<i>Epomophorus labiatus</i> (Temminck, 1837)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
<i>Epomophorus minimus</i> Claessen and de Vree, 1991	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
<i>Epomophorus wahlbergi</i> (Sundevall, 1846)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
<i>Epomops buettikoferi</i> (Matschie, 1899)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
<i>Epomops dobsonii</i> (Bocage, 1889)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
<i>Epomops franqueti</i> (Tomes, 1860)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
<i>Hypsignathus monstrosus</i> H. Allen, 1861	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
<i>Lissonycteris angolensis</i> (Bocage, 1898)*	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
<i>Megaloglossus woermanni</i> Pagenstecher, 1885	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
<i>Micropteropus intermedius</i> Hayman, 1963	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
<i>Micropteropus pusillus</i> (Peters, 1868)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
<i>Myonycteris relicta</i> Bergmans, 1980	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
<i>Myonycteris torquata</i> (Dobson, 1878)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
<i>Naonycteris veldkampii</i> (Jentink, 1888)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
<i>Plerotes anchietae</i> (Seabra, 1900)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
<i>Pteropus seychellensis</i> Milne-Edwards, 1877	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
<i>Pteropus voeltzkowi</i> Matschie, 1909	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
<i>Rousettus aegyptiacus</i> (E. Geoffroy, 1810)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
<i>Scotonycteris ophiodon</i> Pohle, 1943	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
<i>Scotonycteris zenkeri</i> Matschie, 1894	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
<i>Stenonycteris lanosus</i> (Thomas, 1906)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Rhinolophidae																		
<i>Rhinolophus alcyone</i> Temminck, 1853	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
<i>Rhinolophus blasii</i> Peters, 1867	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
<i>Rhinolophus capensis</i> Lichtenstein, 1823	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
<i>Rhinolophus clivosus</i> Cretzschmar, 1828	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
<i>Rhinolophus darlingi</i> K. Andersen, 1905	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
<i>Rhinolophus deckenii</i> Peters, 1868	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
<i>Rhinolophus denti</i> Thomas, 1904	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
<i>Rhinolophus eloquens</i> K. Andersen, 1905	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
<i>Rhinolophus fumigatus</i> Rüppell, 1842	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
<i>Rhinolophus guineensis</i> Eisenbraut, 1960	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
<i>Rhinolophus hildebrandtii</i> Peters, 1878	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
<i>Rhinolophus hillii</i> Aellen, 1973	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

Appendix I. Continued.

	Neighboring and exemplar African nations																	
	East Africa																	
	Burundi	Kenya	Rwanda	Tanzania	Uganda	Cameroon	Côte d'Ivoire	Dem. Rep. Congo	Egypt	Ethiopia	Libya	Malawi	Mozambique	Nigeria	Somalia	South Africa	South Sudan	Zambia
<i>Rhinolophus hyllorum</i> Koopman, 1989						1			1	1				1			1	
<i>Rhinolophus hipposideros</i> (Bechstein, 1800)	1	1	1	1	1	1	1	1	1	1		1	1	1	1	1	1	1
<i>Rhinolophus landeri</i> Martin, 1838												1	1	1	1	1	1	1
<i>Rhinolophus maendeleo</i> Kock, Csorba, and Howell, 2000				1							1		1					
<i>Rhinolophus mehelyi</i> Matschie, 1901											1							
<i>Rhinolophus ruwenzorii</i> J. Eric Hill, 1942			1		1			1										
<i>Rhinolophus sakejensis</i> Cotterill, 2002																		
<i>Rhinolophus simulator</i> K. Andersen, 1904		1		1		1	1	1		1		1	1	1	1	1	1	1
<i>Rhinolophus swinyi</i> Gough, 1908				1									1					1
Hipposideridae																		
<i>Asellia patrizii</i> De Beaux, 1931																		
<i>Asellia tridens</i> (É. Geoffroy, 1813)				1					1	1	1						1	
<i>Cloeotis percivali</i> Thomas, 1901		1	1	1	1	1	1	1					1			1		1
<i>Hipposideros abae</i> J. A. Allen, 1917°					1	1	1	1					1			1		1
<i>Hipposideros beatus</i> K. Andersen, 1906					1	1	1	1					1			1		1
<i>Hipposideros caffer</i> (Sundevall, 1846)	1	1	1	1	1	1	1	1		1		1	1	1	1	1	1	1
<i>Hipposideros camerunensis</i> Eisentraut, 1956					1	1	1	1										
<i>Hipposideros curtus</i> G. M. Allen, 1921					1	1	1	1										
<i>Hipposideros cyclops</i> (Temminck, 1853)		1	1	1	1	1	1	1						1			1	
<i>Hipposideros fuliginosus</i> (Temminck, 1853)					1	1	1	1						1			1	
<i>Hipposideros gigas</i> (Wagner, 1845)		1	1	1	1	1	1	1						1			1	
<i>Hipposideros jonesi</i> Hayman, 1947					1	1	1	1						1			1	
<i>Hipposideros uarissae</i> Aellen, 1954					1	1	1	1						1			1	
<i>Hipposideros megalotis</i> (Heuglin, 1861)					1	1	1	1		1				1			1	
<i>Hipposideros ruber</i> (Noack, 1893)	1	1	1	1	1	1	1	1		1		1	1	1	1	1	1	1
<i>Hipposideros vittatus</i> (Peters, 1852)†		1	1	1	1	1	1	1		1		1	1	1	1	1	1	1
<i>Tracops persicus</i> Dobson, 1871					1	1	1	1		1		1	1	1	1	1	1	1
Megadermatidae																		
<i>Cardioderma cor</i> (Peters, 1872)		1	1	1	1	1	1	1		1				1	1	1	1	1
<i>Lavia frons</i> (É. Geoffroy, 1810)	1	1	1	1	1	1	1	1		1		1	1	1	1	1	1	1
Rhinopomatidae																		
<i>Rhinopoma hardwickii</i> Gray, 1831‡					1				1	1				1	1	1	1	1
<i>Rhinopoma macinnesi</i> Hayman, 1937					1					1				1	1	1	1	1
<i>Rhinopoma microphyllum</i> (Brünnich, 1782)					1					1				1	1	1	1	1
Emballonuridae																		
<i>Coleura afra</i> (Peters, 1852)		1	1	1	1	1	1	1		1				1	1	1	1	1
<i>Saccolaimus peli</i> (Temminck, 1853)		1	1	1	1	1	1	1		1				1	1	1	1	1
<i>Taphozous hantiltoni</i> Thomas, 1920		1	1	1	1	1	1	1		1				1	1	1	1	1
<i>Taphozous hildegardeae</i> Thomas, 1909		1	1	1	1	1	1	1		1				1	1	1	1	1
<i>Taphozous nanitiamis</i> É. Geoffroy, 1818		1	1	1	1	1	1	1		1				1	1	1	1	1

East Africa Neighboring and exemplar African nations

	Burundi	Kenya	Rwanda	Tanzania	Uganda	Cameroon	Côte d'Ivoire	Dem. Rep. Congo	Egypt	Ethiopia	Libya	Malawi	Mozambique	Nigeria	Somalia	South Africa	South Sudan	Zambia
<i>Taphozous midiventris</i> Cretzschmar, 1830		1		1	1			1	1					1	1		1	
<i>Taphozous perforatus</i> E. Geoffroy, 1818		1		1	1			1	1	1			1	1	1		1	
Nycteridae																		
<i>Nycteris arge</i> Thomas, 1903	1	1	1	1		1	1	1		1				1			1	1
<i>Nycteris aurita</i> (K. Andersen, 1912)		1		1	1			1		1				1			1	1
<i>Nycteris gaubiensis</i> (K. Andersen, 1912)		1		1	1		1	1		1				1			1	1
<i>Nycteris grandis</i> Peters, 1865		1		1	1		1	1		1		1	1	1			1	1
<i>Nycteris hispida</i> (Schreber, 1775)	1	1	1	1	1		1	1		1		1	1	1	1		1	1
<i>Nycteris intermedia</i> Aellen, 1959		1		1	1		1	1		1		1	1	1			1	1
<i>Nycteris macrotis</i> Dobson, 1876	1	1	1	1	1		1	1		1		1	1	1			1	1
<i>Nycteris major</i> (K. Andersen, 1912)		1		1	1		1	1		1				1			1	1
<i>Nycteris nana</i> (K. Andersen, 1912)		1	1	1	1		1	1		1	1			1			1	1
<i>Nycteris parisii</i> De Beaux, 1924		1	1	1	1		1	1		1	1			1			1	1
<i>Nycteris thebaica</i> E. Geoffroy, 1818	1	1	1	1	1		1	1		1	1			1			1	1
<i>Nycteris vinsoni</i> Dalquest, 1965@									1				1					
<i>Nycteris woodi</i> K. Andersen, 1914			1									1	1					1
Molossidae																		
<i>Chaerephon aloysiisabaudiae</i> (Festa, 1907)					1	1	1	1									1	1
<i>Chaerephon ansorgei</i> (Thomas, 1913)				1	1	1	1	1						1		1	1	1
<i>Chaerephon benneloni</i> (Jentink, 1879)				1	1	1	1	1		1				1		1	1	1
<i>Chaerephon bivittatus</i> (Heuglin, 1861)		1	1	1	1			1		1				1		1	1	1
<i>Chaerephon chapini</i> J. A. Allen, 1917°		1		1	1			1		1				1		1	1	1
<i>Chaerephon major</i> (Trouessart, 1897)		1		1	1			1		1				1		1	1	1
<i>Chaerephon nigeriae</i> Thomas, 1913		1		1	1	1	1	1		1		1	1	1		1	1	1
<i>Chaerephon pumilus</i> (Cretzschmar, 1830)		1		1	1			1		1		1	1	1		1	1	1
<i>Chaerephon russatus</i> J. A. Allen, 1917°		1		1	1			1		1		1	1	1		1	1	1
<i>Chaerephon shortridgei</i> Thomas, 1926						1		1		1				1		1	1	1
<i>Mops bakarii</i> Stanley, 2008				1														
<i>Mops brachypterus</i> (Peters, 1852)		1		1	1	1	1	1						1				
<i>Mops condylurus</i> (A. Smith, 1833)		1		1	1	1	1	1		1				1		1	1	1
<i>Mops congicus</i> J. A. Allen, 1917°		1		1	1	1	1	1		1				1		1	1	1
<i>Mops demonstrator</i> (Thomas, 1903)					1	1	1	1		1				1		1	1	1
<i>Mops nidas</i> (Sundevall, 1843)					1	1	1	1		1				1		1	1	1
<i>Mops namulus</i> J. A. Allen, 1917°		1		1	1	1	1	1		1				1		1	1	1
<i>Mops niaungarae</i> J. A. Allen, 1917°		1		1	1	1	1	1		1				1		1	1	1
<i>Mops niveiventer</i> Cabrera and Ruxton, 1926				1				1										
<i>Mops petersoni</i> (El Rayah, 1981)						1		1										
<i>Mops spurrelli</i> (Dollman, 1911)						1	1	1										
<i>Mops thersites</i> (Thomas, 1903)						1	1	1										
<i>Mops trevori</i> J. A. Allen, 1917°		1	1	1	1	1	1	1										
<i>Mormopterus acetabulosus</i> (Hermann, 1804)										1								
<i>Myopterus daubentonii</i> Desmarest, 1820										1								

	East Africa										Neighboring and exemplar African nations									
	Burundi	Kenya	Rwanda	Tanzania	Uganda	Cameroon	Côte d'Ivoire	Dem. Rep. Congo	Egypt	Ethiopia	Libya	Malawi	Mozambique	Nigeria	Somalia	South Africa	South Sudan	Zambia		
<i>Myotis whiteleyi</i> (Scharff, 1900)					1	1		1				1								
<i>Otomops maritimensis</i> (Matschie, 1897)	1		1	1	1		1	1	1		1			1						
<i>Platymops setiger</i> (Peters, 1878)	1								1								1			
<i>Sauromys petrophilus</i> (Roberts, 1917)												1								
<i>Tadarida aegyptiaca</i> (E. Geoffroy, 1818)	1		1	1	1			1	1			1		1			1			
<i>Tadarida fulminans</i> (Thomas, 1903)	1		1	1				1			1						1			
<i>Tadarida lobata</i> (Thomas, 1891)	1																			
<i>Tadarida teniotis</i> (Rafinesque, 1814)	1			1	1			1	1		1		1			1	1			
<i>Tadarida ventralis</i> (Heuglin, 1861)	1			1	1			1	1		1		1			1	1			
Miniopteridae																				
<i>Miniopterus africanus</i> Sanborn, 1936§	1			1					1											
<i>Miniopterus fraterculus</i> Thomas and Schwann, 1906			1		1			1	1		1		1			1	1			
<i>Miniopterus inflatus</i> Thomas, 1903	1		1	1	1	1		1	1				1							
<i>Miniopterus minor</i> Peters, 1867	1		1	1	1			1	1				1							
<i>Miniopterus natalensis</i> (A. Smith, 1833)	1		1	1	1			1	1				1							
<i>Miniopterus schreibersii</i> (Kuhl, 1817)	1					1		1	1	1			1							
Vespertilionidae																				
<i>Barbastella leucomelas</i> (Cretzschmar, 1826)									1											
<i>Cistugo lesueurii</i> Roberts, 1919																1				
<i>Cistugo seabrai</i> Thomas, 1912																1				
<i>Eptesicus floweri</i> (de Winton, 1901)																				
<i>Eptesicus hottentotus</i> (A. Smith, 1833)																				
<i>Eptesicus platyops</i> (Thomas, 1901)	1												1					1		
<i>Eptesicus serotinus</i> (Schreber, 1774)																				
<i>Eptesicus</i> sp.																				
<i>Glauconycteris alboguttatus</i> J. A. Allen, 1917°																				
<i>Glauconycteris argentata</i> (Dobson, 1875)	1		1	1				1			1									
<i>Glauconycteris beatrix</i> Thomas, 1901																				
<i>Glauconycteris curryae</i> Eger and Schlitter, 2001																				
<i>Glauconycteris egeria</i> Thomas, 1913					1															
<i>Glauconycteris gleni</i> Peterson and Smith, 1973#																				
<i>Glauconycteris humeralis</i> J. A. Allen, 1917°#					1															
<i>Glauconycteris kenyacola</i> Peterson, 1982																				
<i>Glauconycteris poensis</i> (Gray, 1842)#																				
<i>Glauconycteris superba</i> Hayman, 1939																				
<i>Glauconycteris variegata</i> (Tomes, 1861)																				
<i>Hypsugo anchietae</i> (Seabra, 1900)																				
<i>Hypsugo ariel</i> (Thomas, 1904)																				
<i>Hypsugo bodenheimeri</i> (Harrison, 1960) □																				
<i>Hypsugo crassulus</i> (Thomas, 1904)					1													1		
<i>Hypsugo eisentrauti</i> (Hill, 1968)					1													1		
<i>Hypsugo muscivulus</i> Thomas, 1913)					1													1		

	Neighboring and exemplar African nations																	
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<i>Kerivoula africana</i> Dobson, 1878																		
<i>Kerivoula argentata</i> Tomes, 1861																		
<i>Kerivoula cuprosa</i> Thomas, 1912																		
<i>Kerivoula eriophora</i> (Heuglin, 1877)																		
<i>Kerivoula lanosa</i> (A. Smith, 1847)																		
<i>Kerivoula phalaena</i> Thomas, 1912																		
<i>Kerivoula smithii</i> Thomas, 1880																		
<i>Laephotis angolensis</i> Monard, 1935																		
<i>Laephotis botswanae</i> Setzer, 1971																		
<i>Laephotis wintoni</i> Thomas, 1901																		
<i>Mimetillus moloneyi</i> (Thomas, 1891)																		
<i>Myotis bocagii</i> (Peters, 1870)																		
<i>Myotis morrisi</i> Hill, 1971																		
<i>Myotis punicus</i> Felten, Spitzenberger, and Storch, 1977																		
<i>Myotis scotti</i> Thomas, 1927																		
<i>Myotis tricolor</i> (Temminck, 1832)																		
<i>Myotis welwitschii</i> (Gray, 1866)																		
<i>Neoromicia brunnea</i> (Thomas, 1880)																		
<i>Neoromicia capensis</i> (A. Smith, 1829)																		
<i>Neoromicia guineensis</i> (Bocage, 1889)																		
<i>Neoromicia helios</i> (Heller, 1912)																		
<i>Neoromicia cf. melckorum</i> (Roberts, 1919)																		
<i>Neoromicia nana</i> (Peters, 1852)																		
<i>Neoromicia rendalli</i> (Thomas, 1889)																		
<i>Neoromicia somalica</i> (Thomas, 1901)																		
<i>Neoromicia tenuipinnis</i> (Peters, 1872)																		
<i>Neoromicia zuluensis</i> (Roberts, 1924)																		
<i>Nyctalus lasiopterus</i> (Schreber, 1780)																		
<i>Nyctalus leisleri</i> (Kuhl, 1817)																		
<i>Nyctalus noctula</i> (Schreber, 1774)																		
<i>Nycticeinops schlieffeni</i> (Peters, 1859)																		
<i>Otonycteris hemprichi</i> Peters, 1859																		
<i>Phoniscus aerea</i> (Tomes, 1858)																		
<i>Pipistrellus aero</i> Heller, 1912																		
<i>Pipistrellus deserti</i> Thomas, 1902**																		
<i>Pipistrellus grandidieri</i> (Dobson, 1876)††																		
<i>Pipistrellus hesperidus</i> (Temminck, 1840)‡‡																		
<i>Pipistrellus inexpectatus</i> Aellen, 1959																		
<i>Pipistrellus kuhlii</i> (Kuhl, 1817)																		
<i>Pipistrellus nanulus</i> Thomas, 1904																		
<i>Pipistrellus permixtus</i> Aellen, 1957																		
<i>Pipistrellus pipistrellus</i> (Schreber, 1774)																		
<i>Pipistrellus rupeellii</i> (J. Fischer, 1829)																		

	East Africa										Neighboring and exemplar African nations							
	Burundi	Kenya	Rwanda	Tanzania	Uganda	Cameroon	Côte d'Ivoire	Dem. Rep. Congo	Egypt	Ethiopia	Libya	Malawi	Mozambique	Nigeria	Somalia	South Africa	South Sudan	Zambia
<i>Pipistrellus rusticus</i> (Tomes, 1861)	1			1	1				1			1			1			1
<i>Pipistrellus cf. tenuis</i> (Temminck, 1840)						1												
<i>Plecotus balensis</i> Kruskop and Lavrenchenko, 2000									1									1
<i>Plecotus christii</i> Gray, 1838										1								
<i>Plecotus teneriffae</i> (Barrett-Hamilton, 1907)											1							
<i>Scotoecus albigula</i> Thomas, 1909	1				1						1				1			1
<i>Scotoecus albofuscus</i> (Thomas, 1890)	1			1	1		1	1			1	1		1				1
<i>Scotoecus hindei</i> Thomas, 1901	1			1	1						1	1		1				1
<i>Scotoecus lurundo</i> (de Winton, 1899)	1			1	1		1	1			1	1		1				1
<i>Scotophilus dinganii</i> (A. Smith, 1833)	1		1	1	1		1	1			1	1		1				1
<i>Scotophilus leucogaster</i> (Cretzschmar, 1830)	1		1	1	1		1	1			1	1		1				1
<i>Scotophilus nigrita</i> (Schreber, 1774)	1		1	1	1		1	1			1	1		1				1
<i>Scotophilus nucella</i> Robbins, 1983	1		1	1	1		1	1			1	1		1				1
<i>Scotophilus nux</i> Thomas, 1904§§	1		1	1	1		1	1			1	1		1				1
<i>Scotophilus viridis</i> (Peters, 1852)##	33	108	49	105	98	88	77	117	21	79	19	59	69	87	43	55	82	69

Taxonomic notes:

- * – This species was recorded in Wiki- listings as *L. smithi*, *L. petraea*, and *L. goliath* for Côte d'Ivoire, Ethiopia, and Mozambique and Zambia, respectively. Pending a complex-wide revision, we follow Simmons (2005) in listing them all as forms of *L. angolensis*.
- ° – Species described by J. A. Allen in Allen et al. (1917).
- † – Following Simmons (2005), this species includes *marungensis*.
- ‡ – For purposes of this checklist, this species includes *muscatellum*, although we recognize the unsettled nature of these names (cf. Simmons, 2005; Hulva et al., 2007; IUCN, 2011).
- @ – The status of this species is uncertain; we follow Van Cakenberghe & de Vree (1998), Simmons (2005), and IUCN (2011) in treating it as valid (but see Monadjem et al., 2010a).
- § – Records for the presence of this species can be found in Stanley (2011) and Sanborn (1936).
- # – These three species were recorded in western Tanzania by Stanley and Foley (2008).
- ¤ – May be conspecific with *Hypsugo ariel* (see Mayer et al., 2007).
- ** – This species was excluded from Kenya on geographic grounds (cf. IUCN, 2011).
- †† – Records for Cameroon, Malawi, and Mozambique were reported as *Neoromicia flavescens*, a synonym of *Pipistrellus grandidieri* (Thorn et al., 2007).
- ‡‡ – Although the Somali record was listed as *Pipistrellus kulilii*, we believe it more likely represents a record of *P. hesperidus*.
- ˆ – Name published in Hill and Morris (1971).
- ˆ – Name published in Zimmermann (1780).
- §§ – Both *Scotophilus nux* and *S. nucella* were listed for Côte d'Ivoire.
- ## – Ugandan records were listed by Thorn et al. (2009) as *Scotophilus nigritellus*, a supposed synonym (Simmons, 2005).

Appendix II

Dental formulae for East African bat genera, from Koopman (1994). Counts of teeth on each side of the maxillary (uppercase headings) and mandibular (lowercase headings) jaws: I/i, incisors; C/c, canines; P/p, premolars; M/m, molars; total contains the bilateral sum.

	I	i	C	c	P	p	M	m	Total
Pteropodidae									
<i>Casinycteris</i> Thomas, 1910	2	2	1	1	2	3	1	2	28
<i>Eidolon</i> Rafinesque, 1815	2	2	1	1	3	3	1	3	34
<i>Eponiophorus</i> Bennett, 1836	2	2	1	1	2	3	1	2	28
<i>Epomops</i> Gray, 1870	2	2	1	1	2	3	1	2	28
<i>Hypsignathus</i> H. Allen, 1861	2	2	1	1	2	3	1	2	28
<i>Lissonycteris</i> Andersen, 1912	2	2	1	1	3	3	2	3	34
<i>Megaloglossus</i> Pagenstecher, 1885	2	2	1	1	3	3	2	3	34
<i>Micropteropus</i> Matschie, 1899	2	2	1	1	2	3	1	2	28
<i>Myonycteris</i> Matschie, 1899	2	2	1	1	3	3	2	2-3*	32-34
<i>Pteropus</i> Erxleben, 1777	2	2	1	1	3	3	2	3	34
<i>Rousettus</i> Gray, 1821	2	2	1	1	3	3	2	3	34
<i>Stenonycteris</i> Andersen, 1912 +	2	2	1	1	3	3	2	3	34
Rhinolophidae									
<i>Rhinolophus</i> Lacepede, 1799	1	2	1	1	2	3	3	3	32
Hipposideridae									
<i>Asellia</i> Gray, 1838	1	2	1	1	1	2	3	3	28
<i>Cloeotis</i> Thomas, 1901	1	2	1	1	2†	2	3	3	30
<i>Hipposideros</i> Gray, 1831	1	2	1	1	2	2	3	3	30
<i>Triaenops</i> Dobson, 1871	1	2	1	1	2	2	3	3	30
Megadermatidae									
<i>Cardiaderma</i> Peters, 1873	0	2	1	1	1	2	3	3	26
<i>Lavia</i> Gray, 1838	0	2	1	1	1	2	3	3	26
Rhinopomatidae									
<i>Rhinopoma</i> É. Geoffroy, 1818	2	2	1	1	1	2	3	3	28
Emballonuridae									
<i>Coleura</i> Peters, 1867	1	3	1	1	2	2	3	3	32
<i>Saccolaimus</i> Temminck, 1841	1	2	1	1	2	2	3	3	30
<i>Taphozous</i> É. Geoffroy, 1818	1	2	1	1	2	2	3	3	30
Nycteridae									
<i>Nycteris</i> É. Geoffroy and G. Cuvier, 1795	2	3	1	1	1	2	3	3	32
Molossidae									
<i>Chaerephon</i> Dobson, 1874	1	2	1	1	2	2	3	3	30
<i>Mops</i> Lesson, 1842	1	1-2	1	1	1-2	2	3	3	28-30
<i>Myopterus</i> É. Geoffroy, 1818	1	1	1	1	1	2	3	3	26
<i>Otonops</i> Thomas, 1913	1	2	1	1	2	2	3	3	30
<i>Platymops</i> Thomas, 1906	1	2-3	1	1	1-2‡	2	3	2	28-30
<i>Tadarida</i> Rafinesque, 1814	1§	2	1	1	2	2	3	3	30
Miniopteridae									
<i>Miniopterus</i> Bonaparte, 1837	2	3	1	1	2	3	3	3	36
Vespertilionidae									
<i>Eptesicus</i> Rafinesque, 1820	2	3	1	1	1	2	3	3	32
<i>Glauconycteris</i> Dobson, 1875	2	3	1	1	1	2	3	3	32
<i>Hypsugo</i> Kolenati, 1856	2	3	1	1	2	2	3	3	34
<i>Kerivoula</i> Gray, 1842	2	3	1	1	3	3	3	3	38
<i>Laephotis</i> Thomas, 1901	2	3	1	1	1	2	3	3	32
<i>Mimetillus</i> Thomas, 1904 □	2	3	1	1	1	2	3	3	32
<i>Myotis</i> Kaup, 1829	2	3	1	1	3	3	3	3	38
<i>Neoromicia</i> Roberts, 1926	2	3	1	1	1	2	3	3	32
<i>Nycticeinops</i> Hill and Harrison, 1987	1	3	1	1	1	2	3	3	30
<i>Pipistrellus</i> Kaup, 1829	2	3	1	1	1-2	2	3	3	32-34
<i>Scotoecus</i> Thomas, 1901	1	3	1	1	2	2	3	3	32
<i>Scotophilus</i> Leach, 1821	1	3	1	1	1	2	3	3	30

* m3 absent in *relicta*.

+ Not recognized by Koopman (1994); numbers are those of *Rousettus*, to which he allocated *S. lanosus*.

† Small P may be lost.

‡ First P vestigial or absent.

§ Outer I absent.

□ Published in Thomas (1904c).